

MUNICIPALITY OF COLOMBO.

REPORT

OF THE

MEDICAL OFFICER OF HEALTH,

FOR THE YEAR



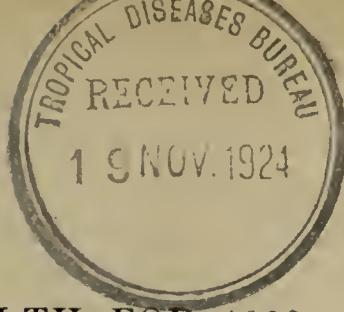
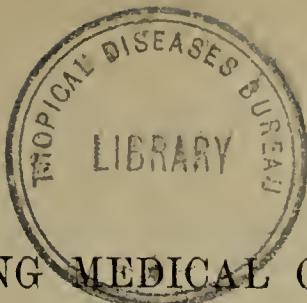
ANNUAL REPORT FOR 1923.

Correction Slip.

In place of statement 36. Page 25 substitute the following :—

(36) *Malaria in Ceylon.*

	1920.	1921.	1922.	1923.
Hospital cases treated in the whole Island...	16,538 ...	27,453 ...	29,377 ...	34,522
Hospital cases treated in the Western Province exclusive of the General Hospital, Colombo	2,807 ...	4,036 ...	6,640 ...	6,062
Cases treated at the General Hospital Colombo as inpatients	767 ...	1,125 ...	2,121 ...	2,280
Dispensary cases in the whole Island ...	488,832 ...	888,699 ...	956,810 ...	1,193,225



REPORT OF THE ACTING MEDICAL OFFICER OF HEALTH FOR 1923.

I HAVE the honour to submit the Report of the Public Health Department for the year 1923.

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INTRODUCTION.

The year under review was rather an eventful one for the Public Health Department. For some years past it had been found that the Medical Staff of the Council, which consisted of one Health Officer and two assistants and which had not been increased since 1908, was totally inadequate to cope with the work which had grown very considerably as a result of the extension of the town, the increase of the population, the introduction of plague, the establishment of Municipal Dispensaries, laundries, &c. Although representations were made by the Medical Officer of Health from time to time, urging the appointment of a third assistant, these were not favourably entertained by the Council. In February of last year my health broke down and I was compelled to go on leave; the higher staff was thereby reduced to two officers and the work which had been too much for three men had now to be done by the two left behind. The burden naturally fell more heavily on Dr. Philip, who as Medical Officer of Health, was directly responsible for the administration of the department. Dr. Philip pluckily carried on with only one assistant for six months, but the inevitable happened, and his health, which had suffered from prolonged over work, completely gave way under the extra strain, and he was ordered off immediately by his medical adviser. The appointment of a third assistant, which had been urged frequently by the Medical Officer of Health and the Chairman, now became imperative, and on August 8 Council appointed Dr. C. H. Gunasekera to the post in which he was confirmed in November, after the usual probationary period of three months.

Dr. Loos, the second Assistant Medical Officer of Health, acted as Medical Officer of Health until my return from leave at the end of October when I assumed duties as Acting Medical Officer of Health.

The task that has devolved on me of writing a report on the health of the city and the work done by this department last year has not been an easy one owing to my absence from the Island during the greater part of it and the consequent lack of first hand knowledge of conditions obtaining during the year. For this reason and also owing to the limited time at my disposal for writing this report and the heavy routine work of the department I have been compelled to abridge it.

The health of the city as gauged by the amount of sickness and the mortality was not satisfactory. The crude death-rate was 35.5, as against 31.1 per thousand in the preceding year and 29.8 the average for the preceding ten years. Exclusive of the deaths of non-residents which occurred in the hospitals the death-rate was 31.1 per thousand. Even this rate is fallacious as it has been calculated on a population figure very much below the real. At the time the census was taken Colombo had not fully recovered from the effects of the war and a great part of the large immigrant population, which had left the town during the war, had not returned, so that the population figure obtained at the census was considerably below the true figure.

Conditions have now changed, trade is flourishing, prosperity is returning and with it those who left the town and also fresh immigrants in search of employment so that the population of 300,924 obtained on the basis of the estimates prior to 1921 may be taken as nearer the mark than 250,433 obtained on the basis of the census population of 1921. The death-rate calculated on this population, *i.e.*, 300,924 is 29.6 per thousand and 25.9 per thousand exclusive of the deaths of non-residents.

The unusual weather conditions that prevailed last year were, no doubt, mainly responsible for the increase of the death-rate over the previous year but, apart from this, the average death-rates from phthisis, pneumonia, enteric fever, and infant mortality, are still very high. The principal causes which maintain these death-rates at a high level are bad housing conditions under which the poorer classes live, the bucket-latrine system, bad drainage, and poverty.

Of all the problems the Municipality is faced with the one dealing with the housing of the working classes is in my opinion the most important and urgent. The great wastage of human life, not to speak of the suffering and loss of efficiency occasioned by disease, that takes place every year imperatively demands the earliest attention to this problem. No satisfactory reduction in the general death-rate could be expected so long as a considerable proportion of the population lives under conditions most favourable to the generation and spread of disease and most inimical to health and life. There are other problems too awaiting solution such as infant mortality, malaria, adulteration of food, drainage, &c., but in order of importance the question of housing comes first.

Dr. Hirst has again done much invaluable work in original investigation and research and attention is drawn to his valuable report which is annexed.

I.—STAFF OF THE PUBLIC HEALTH DEPARTMENT ON DECEMBER 31, 1923.

Dr. Wm. Marshall Philip, M.B., C.M., D.P.H. (Aberd.), Medical Officer of Health (on leave).
 Dr. C. V. Aserappa, L.R.C.P. (Lond.), M.R.C.S. (Eng.), D.P.H. (Oxon.), D.T.M. & H. (Cantab.), 1st Assistant Medical Officer of Health, Acting Medical Officer of Health.
 Dr. E. R. Loos, L.M.S. (Ceylon), 2nd Assistant Medical Officer of Health.
 Dr. C. H. Gunasekera, B.A. (Cantab.), L.R.C.P. (Lond.) M.R.C.S. (Eng.), D.P.H. (Cantab.), 3rd Assistant Medical Officer of Health.

Laboratory.

Dr. L. Fabian Hirst, M.D., B.S., D.P.H. (Lond.), L.R.C.P. (Lond.), M.R.C.S. (Eng.), City Bacteriologist.
 C. A. Woutersz, Assistant to Bacteriologist.
 A. C. Mortier, Junior Laboratory Assistant.
 J. A. A. Fernando, Clerk and Storekeeper.
 Jubial Caldera, Laboratory Attendant.
 One peon, one temporary attendant, and two coolies.
 M. Kelway Bamber, F.I.C., M.R.A.C., M.R.A.S. (Eng.), F.C.S. } City Analysts.*
 A. Bruce, B.Sc., F.C.S., }

Municipal Enteric Hospital.

Dr. K. K. Jacob, L.R.C.P. & S. (Edin.), L.F.P. & S. (Glas.), Medical Officer.
 J. O. Fernand, Apothecary.
 Miss Grace Ebert, Matron.
 Nurse (vacant).
 One orderly, two male attendants, two female attendants, one ayah, one cook, one dhoby, and two sweepers.

Municipal Dispensaries.

(1) *Slave Island Dispensary*.—Dr. D. W. Perera, L.M.S. (Ceylon), Medical Officer.
 C. S. Fernando, Apothecary.
 One orderly and one punkah cooly.

Municipal Dispensaries—contd.

(2) *St. Paul's Dispensary*.—Dr. V. K. Paramanayagam, L.R.C.P. & S. (Edin.), L.R.F.P. & S. (Glas.), Medical Officer.
 T. Fernando, Apothecary.
 One orderly.
 (3) *Maradana Dispensary*.—Dr. J. G. Kannangara, L.M.S. (Ceylon), Medical Officer.
 T. L. Fernando, Apothecary.
 One orderly.
 (4) *Modera Dispensary*.—Dr. S. D. Fernando, L.M.S. (Ceylon), Medical Officer.
 T. W. Lappen, Apothecary.
 One orderly.

Municipal Slaughter-house.

J. D. Ebert, Superintendent.
 K. L. V. Silva, Assistant Superintendent and Clerk.
 Eleven coolies.

Office Staff.

J. C. Deweendre, Chief Clerk.
 Jacob de Silva, Second Clerk.
 M. H. C. Cooray, Statistical Clerk.
 V. H. Schoorman, Assistant Statistical Clerk.
 H. J. A. M. Abeynayake, Correspondence Clerk.
 J. V. Mendis, Bookkeeper.
 G. B. Silva, Recordkeeper.
 O. B. Silva, Typist.
 H. Weerappa }
 W. P. Jayewardene } Registering Clerks.
 One binder, four peons, four orderlies, one telephone operator, and two coolies.

Health Inspection Staff.

W. St. G. Blacker, Inspector.
 T. E. Karunatileke, Inspector.
 R. A. Horan, Inspector.
 F. E. Abeysekera, Inspector.

* A private firm doing Council's work for an annual fee.

I.—STAFF OF THE PUBLIC HEALTH DEPARTMENT ON DECEMBER 31, 1923—*contd.**Health Inspection Staff*—*contd.*

E. Ambrose, Inspector.
 A. E. La Brooy, Inspector.
 M. E. Akbar, Inspector.
 E. B. Milshuisen, Inspector.
 S. L. Toussaint, Inspector.
 C. B. Brohier, Inspector.
 S. C. Forbes, Inspector.
 N. Schokman, Inspector.
 C. W. Anthonisz, Inspector.
 B. H. de Zoysa, Inspector.
 Mrs. Rose Balmont, Inspectress, Muhammadan quarters.
 S. de Silva, Relief Inspector.
 W. W. Wickremasinghe, Sub-Inspector.
 M. M. Molligoda, Sub-Inspector.
 D. E. P. Karunaratne, Sub-Inspector.
 Vacant, Sub-Inspector.
 Vacant, Sub-Inspector.

Anti-Plague Staff.

M. C. Fernando, Inspector.
 W. G. Fernando, Overseer.
 T. J. A. Sally, Overseer.
 P. W. Simons, Overseer.
 J. Martin, Overseer.
 B. D. Cornelis, Overseer.
 F. H. Dias, Overseer.
 Twelve masons, sixty-one coolies, and one cart.

Anti-Mosquito Staff.

J. P. J. Mendis, Sub-Inspector.
 H. A. Casie-Chetty, Overseer.
 E. S. Fernando, Overseer.
 F. P. Jayewardene, Overseer.
 M. S. Dekkar, Overseer.
 L. T. Perera, Overseer.
 E. M. Jansz, Overseer.
 Twelve coolies.

Maternity and Child Welfare Staff.

Mrs. A. Cruse, Health Visitor.
 Mrs. A. B. Perera, Health Visitor.
 Miss L. G. Wilson, Health Visitor.
 Mrs. F. E. M. Harris, Health Visitor.
 Mrs. W. Paton, Health Visitor.
 Mrs. M. Fernando, Health Visitor.
 Mrs. E. Raymond, Health Visitor.
 Mrs. M. John, Health Visitor.
 Mrs. Ida de la Harpe, Health Visitor.
 Mrs. H. V. Samarasekera, Health Visitor.
 Mrs. C. E. Alphonso, Health Visitor.
 Nonno Hamy, Midwife.
 Angelina Fernando, Midwife.
 Medlin Perera, Midwife.
 Emily Direckze, Midwife.
 K. Thavamony, Midwife.
 D. B. Dias, Midwife.
 Roslin Perera, Midwife.

Number.—In 1923 there were nine pensionable posts on the higher staff; eighty-four pensionable posts on the subordinate staff; twenty-four employed in non-pensionable posts; and 211 employed on the daily paid staff.

Higher Officers on Leave.—Dr. C. V. Aserappa, 1st Assistant Medical Officer of Health, was on sick leave from February 27, 1923, to October 26, 1923.

Dr. L. F. Hirst, Bacteriologist, was on leave from March 21, 1923, to October 21, 1923.

Dr. Wm. Marshall Philip, Medical Officer of Health, was granted ten months' sick leave as from August 9, 1923.

Disinfecting Station.

A. L. A. Pears, Overseer.
 Thirteen coolies.
 One female Ambulance Attendant.
 Two Motor Vans.

Cleansing Gang.

M. T. Cassiere, Overseer.
 Six coolies.
 One cart.

Municipal Markets.

J. La Brooy, Marketkeeper, Dean's road market.
 B. de Andrade, Assistant Marketkeeper, Dean's road market.
 D. L. Perera, Marketkeeper, Grandpass market.
 S. V. E. Fernando, Marketkeeper, Edinburgh and Price park markets.
 E. G. Silva, Assistant Marketkeeper, Edinburgh and Price park markets.
 K. R. Emran, Marketkeeper, St. John's road market.
 B. A. Perera, Assistant Marketkeeper, St. John's road market.
 M. P. Gomes, Marketkeeper, Kollupitiya and Bambalapitiya markets.
 O. Pereira, Marketkeeper, Kotahena market.
 K. S. Ramen, Assistant Marketkeeper, Kotahena market.
 A. W. Nelson, Marketkeeper, Borella market.
 D. F. Ranasinghe, Assistant Marketkeeper, Borella market.
 Thirty-eight coolies.

Municipal Laundries.

C. M. Gunaratne, Caretaker, Bloemendahl Laundry.
 B. R. Aher, Caretaker, Wekande Laundry.
 Two coolies.

Municipal Cemeteries.

E. L. Herft, Keeper, Kanatta Cemetery.
 B. de Livera, Assistant Keeper, Kanatta Cemetery.
 E. G. La Brooy, Keeper, Madampitiya Cemetery.
 A. C. Solomons, Keeper, Liveramentu Cemetery
 Singo Appu, Head Gardener, Kanatta Cemetery.
 Martin de Costa, Messenger.
 Twenty-seven coolies.

Municipal Segregation Camp.

J. O. Fernando, Overseer.
 Two male attendants, one female attendant, and one sweeper.

II.—NEW APPOINTMENTS.

Dr. C. H. Gunasekera, B.A. (Cantab.), L.R.C.P. (Lond.), M.R.C.S. (Eng.), D.P.H. (Cantab.), was appointed 3rd Assistant Medical Officer of Health on November 8, 1923.

C. M. Guneratne was appointed Caretaker of the Blomendahl laundry on January 24, 1923.
 A. C. Mortier was appointed Junior Laboratory Assistant on March 1, 1923.
 B. R. Aher was appointed Caretaker of the Wekande laundry on March 5, 1923.
 C. S. Fernando was appointed Apothecary, Slave Island Dispensary, on April 18, 1923.
 D. F. Ranasinghe was appointed Assistant Marketkeeper, Borella, on April 28, 1923.
 F. H. Diaz was appointed Plague Overseer on May 11, 1923.
 L. A. Nanayakkara was appointed Telephone Operator on May 11, 1923.
 E. G. Silva was appointed Assistant Marketkeeper, Edinburgh market, on May 15, 1923.
 K. S. Ramen was appointed Assistant Marketkeeper, Kotahena, on May 18, 1923.
 B. de Andrade was appointed Assistant Marketkeeper, Dean's road market, on May 22, 1923.

III.—CHANGES IN THE PERSONNEL OF THE STAFF.

On the departure of Dr. Marshall Philip, Dr. E. R. Loos, the 2nd Assistant Medical Officer of Health, was appointed Acting Medical Officer of Health, until the return from leave of Dr. C. V. Aserappa, the 1st Assistant Medical Officer of Health.

Dr. C. V. Aserappa assumed duties as Acting Medical Officer of Health on his return from leave on October 27, 1923.

During the absence of Dr. Hirst Mr. C. A. Woutersz carried on the routine work and administration of the Laboratory.

Dr. V. K. Paramanayagam, Medical Officer of St. Paul's Dispensary, was transferred to the Maradana Dispensary as from December 1, 1923, and Dr. J. G. Kannangara of the Maradana Dispensary was appointed to the St. Paul's Dispensary.

The following Apothecaries were transferred as from February 1, 1923 :—

C. P. Jayawardena from Maradana to Slave Island.

J. O. Fernand from Slave Island to the Municipal Enteric Hospital.

T. L. Fernando from St. Paul's to Maradana.

Thomas Fernando from the Enteric Hospital to St. Paul's Dispensary.

I regret to record the deaths of Sanitary Inspectors I. C. Jayasinghe and J. G. Dabera which occurred on August 28, 1923, and December 25, 1923, respectively. The former had put in 19 years' service and the latter 24 years' service.

Relief Inspector C. W. Anthonisz was promoted to the grade of Inspector to fill the vacancy caused by the death of Inspector Jayasinghe.

Sub-Inspector B. H. de Zoysa was promoted to the grade of Inspector to fill the vacancy caused by the death of Inspector J. G. Dabera.

Sub-Inspector S. de Silva was appointed Relief Inspector.

G. B. Silva, the Recordkeeper, was appointed temporarily to one of the two vacancies in the Sub-Inspectorate.

C. P. Jayawardene, Apothecary, Slave Island Dispensary, resigned his post on April 20, 1923, to take up an appointment in the Civil Medical Department.

A. W. Nelson, the Assistant Marketkeeper, Dean's road market, was appointed Marketkeeper of Borella market on April 28, 1923.

O. Perera, Assistant Marketkeeper of Edinburgh market, was appointed Marketkeeper of Kotahena market on April 27, 1923.

IV.—EXPENDITURE.

Expenditure on various Branches.

			Rs. c.
Higher Staff	...	...	37,755 36
Clerical Staff	...	...	15,317 43
Sanitary Branch	...	...	191,008 36
Dispensaries	...	...	50,945 91
Enteric Hospital	...	...	12,905 44
Markets	...	...	18,738 48
Slaughter-house	...	...	11,952 39
Cemeteries	...	...	13,248 50
Laboratory	...	...	21,327 14
Laundries	...	...	1,297 67
Total	...		374,497 4

Percentage of Salaries to total expenditure 58.2.

V.—NEW EQUIPMENT PURCHASED IN 1923.

- (1) Four hand Clayton machines.
- (2) Five miniature Clayton machines.
- (3) Six London Fire Brigade pattern hand pumps.

Cost of New Equipment—Rs. 6,869·96.

VI.—ECONOMIES EFFECTED.

A sum of about Rs. 5,000 was saved by getting drugs for the Municipal Dispensaries direct from London through Council's Agents instead of purchasing them from local dealers.

VII.—NEW WORKS.

Markets.—New Markets at Borella and Kotahena.

St. John's Road Fish Market—Crow-proofing.

Dean's Road Market.—Sunshades to two of the vegetable blocks.

Bambalapitiya Market.—Two offal stalls.

Borella Market.—Ten cabinets for butchers' clothes, and ten masonry ice chambers in fish section.

Kotahena Market.—Eighteen cabinets for butchers' clothes, eight masonry ice chambers in fish section, wire-netting to main gates to prevent entrance of dogs.

Edinburgh Market.—Corrugated iron roof over green vegetable stalls, one new green vegetable stall, and nine hydrant posts.

Kachcheri Road Market.—Corrugated iron roof over green vegetable stalls, and five hydrant posts.

Laundries.

Wekande Laundry.—Rat-proofing soiled linen rooms, three silt traps to drains, one new door and sunshade to caretaker's house.

Bloemendahl Laundry.—Rat-proofing doors, thirteen soiled linen rooms were provided with concrete tables. Eighteen had been done in the previous year.

Disinfecting Station.—Two motor vans for transport of infected and disinfected linen.

Cemeteries.

Kanatta Cemetery.—(1) New mortuary. (2) Drainage of cemetery lavatory, cemetery-keeper's bungalow, Assistant cemetery-keeper's bungalow and cooly lines. (3) New servants' water-closet to Assistant cemetery-keeper's bungalow. (4) Wash basin and tap to retiring room.

Madampitiya Cemetery.—(1) Wider entrance and new wooden gates. (2) New kitchens to cooly lines.

Slaughter-house.—Drainage of sheep slaughtering shed and cattle receiving shed. New water-closet sheep slaughter-house.

VIII.—ORGANIZATION AND ADMINISTRATION AREAS.

The reader is referred to the 1922 Report for a detailed account of the organization of the Public Health Department and the administration areas.

The only change to note is that the town is now divided into sixteen, instead of fourteen, sanitary wards to correspond with the proposed electoral wards. The names of the wards are :—

<ol style="list-style-type: none"> 1. Fort. 2. Pettah. 3. San Sebastian. 4. St. Paul's. 5. Kotahena. 6. Mutwal. 7. New Bazaar. 8. Maradana North. 	<ol style="list-style-type: none"> 9. Maradana South. 10. Dematagoda. 11. Slave Island. 12. Kollupitiya. 13. Cinnamon Gardens. 14. Bambalapitiya. 15. Timbirigasyaya. 16. Wellawatta.
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IX.—GENERAL SANITARY WORK.

Statements 1 and 2 give the details of the general sanitary work done during the year by the outdoor staff. An increase in the amount of work done, compared with the previous year, is noticeable under several headings. For instance, the number of insanitary dwellings structurally improved was 127 as against 114 in the preceding year : the number of insanitary dwellings closed under Plague Regulations was 201 as against 84 ; the number of insanitary dwellings demolished was 100 as against 22 ; the work done by the plague staff in connection with plague prevention shows a marked increase over last year, *vide* headings 17, 18, 19, 20 in statement 1.

Prosecutions.—The number of prosecutions increased from 2,213 in 1922 to 2,483 in 1923, and the number of convictions from 1,959 to 2,335. The total amount of fines was however less, being Rs. 24,268, as against Rs. 27,489·50 in 1922, due to the fall of the average fine from 14·03 in 1922 to Rs. 10·39 in 1923.

(1) Work done by Ward Inspectors during the Year 1923.

(2) *Prosecutions: Details, 1923.*

			No. of Prosecutions.	No. of Convictions.
Section 1, sub-section (1), of Ordinance No. 15 of 1862 : Filthy premises	...	1,003	...	962
Section 1, sub-section (1), of Ordinance No. 15 of 1862 : Filthy aerated water factory	3	...	...	2
Section 1, sub-section (1), of Ordinance No. 15 of 1862 : Filthy diary	...	28	...	22
Section 1, sub-section (1), of Ordinance No. 15 of 1862 : Filthy laundry	...	9	...	6
Section 1, sub-section (1), of Ordinance No. 15 of 1862 : Filthy cattle shed	...	1	...	1
Section 1, sub-section (4), of Ordinance No. 15 of 1862 : Nuisance by cattle, swine, &c.	120	...	...	108
Section 1, sub-section (9), of Ordinance No. 15 of 1862 : Selling unwholesome food	4	...	...	3
Section 39 of Ordinance No. 1 of 1896 : Unlicensed dairy	...	4	...	4
Section 53, chapter 3 of Ordinance No. 1 of 1896 : Unlicensed laundry	...	38	...	36
Section 26 of Ordinance No. 3 of 1897 : Failure to report infectious disease	...	1	...	—
Section 38 of Ordinance No. 3 of 1897 : Failure to fill up well ...	...	12	...	10
Section 49 of Ordinance No. 3 of 1897 : Occupying premises closed under plague regulations	...	...	1	...
Regulation 1 made under section 4 of Ordinance No. 3 of 1897 : Storing rice in unapproved place	...	...	70	...
Section 110 of Ordinance No. 6 of 1910 : Spitting in public market	...	16	...	15
Section 178 of Ordinance No. 6 of 1910 : Failure to limewash ...	...	78	...	66
Section 180 of Ordinance No. 6 of 1910 : Failure to fill swampy land	...	1	...	1
Section 186 of Ordinance No. 6 of 1910 : Failure to provide privy accommodation	8	...	...	7
Section 190B of Ordinance No. 6 of 1910 : Failure to close cesspit	...	3	...	3
Section 194 of Ordinance No. 6 of 1910 : Abuse of roadside by children	...	9	...	9
Section 205 of Ordinance No. 6 of 1910 : Failure to report infectious disease	...	14	...	12
Section 242 of Ordinance No. 6 of 1910 : Unregistered servant in stall	...	1	...	1
Rule 29 of chapter VIII., by-laws : Digging pits and wells without permission	...	7	...	7
Rule 31 of chapter VIII., by-laws : Not using dust bin for rubbish	...	5	...	5
Rule 2 of chapter IX., by-laws : Unpaved public bathing well	...	2	...	1
Rule 4 of chapter IX., by-laws : Filthy bathing place	...	12	...	12
Rule 1 of chapter XI., by-laws : Unlicensed eating-house	...	49	...	49
Rule 1 of chapter XI., by-laws : Unlicensed bakery	...	2	...	2
Rule 5 of chapter XI., by-laws : Filthy utensils in bakery	...	1	...	1
Rule 7 of chapter XI., by-laws : Filthy bakery	...	32	...	31
Rule 7 of chapter XI., by-laws : Filthy eating-house	...	96	...	95
Rule 3 of chapter XI., by-laws : Fail to effect improvement to eating-house	...	1	...	1
Rule 8 of chapter XI., by-laws : Unclean workmen in bakery ...	...	12	...	11
Rule 3 of chapter XIII., by-laws : Disorderly conduct in market	...	50	...	45
Rule 11 of chapter XIII., by-laws : Filthy private stall	...	42	...	42
Rule 14 of chapter XIII., by-laws : Unauthorized articles in stall	...	2	...	1
Rule 23 of chapter XIII., by-laws : Selling unauthorized articles in stall	...	2	...	1
Rule 20 of chapter XIII., by-laws : Unregistered servant in stall	...	1	...	1
Rule 28 of chapter XIII., by-laws : Throwing rubbish in market	...	3	...	3
Rule 29 of chapter XIII., by-laws : Filthy meat stall	...	31	...	19
Rule 31 of chapter XIII., by-laws : Closing stall without permission	...	18	...	18
Rule 33 of chapter XIII., by-laws : Occupying space beyond stall	...	3	...	3
Rule 34 of chapter XIII., by-laws : Obstruction of passage in public market	...	57	...	52
Rule 2A of chapter XIV., by-laws : Exposing food to dust and flies	...	364	...	346
Rule 3 of chapter XIV., by-laws : Sale of adulterated milk ...	...	125	...	120
Rule 5 of chapter XIV., by-laws : Refusing sample of milk ...	...	1	...	1
Rule 7 of chapter XIV., by-laws : Unlicensed milk vendor ...	...	140	...	135
Rule 10 of chapter XVII., by-laws : Failure to repair wall of cemetery	...	1	...	1
Total ...		2,483	2,335	

(3) *Convictions and Fines.*

Year.	Convictions.	Total Fines.		Average Fine. Rs. c.
		Rs.	c.	
1914	1,878	25,551	35	13 60
1915	1,774	24,014	50	13 53
1916	2,246	31,157	0	13 87
1917	1,777	22,307	50	12 55
1918	*1,349	12,819	0	9 50
1919	1,745	15,498	70	8 88
1920	1,986	15,035	75	7 57
1921	2,517	14,978	25	5 95
1922	1,950	27,489	50	14 3
1923	2,335	24,268	0	10 39

* Influenza year.

X.—FOOD INSPECTION.

The subjoined statements show the nature and quantity of food condemned and destroyed in the town during the year. On the whole, the quality of the food sold in the Municipal markets is good owing to the presence in each market of a marketkeeper, who, in addition to being responsible for the cleanliness of the market, is required to examine all meat, fish, &c., brought into and sold in the market.

Judging from the very small number of complaints received from the public it would appear that little bad meat and fish is sold in the town, but there is no doubt that other articles of food, such as tea, coffee, milk, and cooked foods are sold, which are both unwholesome and adulterated.

Certain samples of supposed tea sent to this department for an expression of opinion was found, on examination by the City Analyst, to consist of dried rubber leaves, sweepings, and used tea leaves, &c. A decoction of this stuff was being sold to the public as tea in a tea boutique.

Large quantities of cheap skimmed milks, which are shut out by law from other countries, are dumped in Colombo, and are sold in the town and outstations. Owing to its low price, it finds a ready sale and poor ignorant mothers feed their babies on it, to the great injury of the latter. In the absence of a Food and Drugs Ordinance, this department is powerless to take action; it is hoped that such an Ordinance, the adoption of which has been urged very frequently by Dr. Philip, will be passed in the near future. For the better inspection of food, at least one whole time Inspector, preferably one trained in these duties, is urgently needed. At those special hours in the morning, noon, and evening when the public frequent eating-houses, &c., the Food Inspector should be on duty. It is obvious that the Ward Inspector cannot very well attend to duties of this nature without neglecting his own proper duties.

(4) *Damaged Foodstuffs condemned, 1923.*

Beef	...	...	...	13 $\frac{1}{2}$ lb.
Dryfish	...	...	...	56 lb.
Dates	...	...	...	15 cases.
Potatoes	...	...	...	99 $\frac{1}{2}$ bags.
Dhal	...	...	...	1 bag.
Bran	...	...	...	1 bag.
Flour	...	...	...	8 $\frac{1}{2}$ bags and 16 lb.
Foodstuffs condemned at Customs.				
Dryfish	...	...	...	20 cwt.
Foodstuffs condemned at Chalmers Granaries.				
Rice	...	...	...	1,231 $\frac{3}{4}$ bushels.
Condemned at Kochchikadde Warehouse.				
Dryfish	...	...	...	83 bags.
Biscuits	...	...	...	1,390 tins.
Potatoes	...	...	...	1,444 bags.

(5) *Registered Trades, 1923.*

	Number on Register at end of previous Year.	Number discontinued during the Year under review.	New Registrations during the Year.	Total on Register at end of Year.
Dairies	...	46	8	9
Bakeries	...	48	5	6
Laundries	...	249	31	59
Eating-houses	...	513	126	182
Aerated water factories	...	13	—	1
Opium divans	...	—	—	—

(6) *Food Trades Inspection in 1923.*

	Bakeries.	Dairies.	Eating-houses.	Public Markets.
Fort	...	75	—	659
Pettah	...	53	—	41
San Sebastian	...	47	—	249
St. Paul's	...	92	210	113
Kotahena	...	168	124	184
Mutwal	...	65	38	81
New Bazaar	...	101	107	97
Maradana North	...	45	74	148
Maradana South	...	81	59	238
Dematagoda	...	53	18	64
Slave Island	...	100	57	239
Kollupitiya	...	43	59	41
Cinnamon Gardens	...	27	46	47
Bambalapitiya	...	62	134	122
Timbirigasyaya	...	—	75	34
Wellawatta	...	61	78	134
Total	...	1,073	1,079	2,491

XI.—MARKETS.

During the year two up-to-date public markets were erected at Borella and Kotahena. The one at Borella was opened to the public on May 4, 1923, and the one at Kotahena on April 27, 1923.

Provision has been made at the two markets as follows:—

	Borella.	Kotahena.
Fish stalls	...	11
Beef stalls	...	6
Mutton stalls	...	3
Pork stalls	...	1
Vegetable stalls	...	50
Rat-proof grain stalls	...	2

Each market has in addition a marketkeeper's office, storeroom for tools, &c., and gala* accommodation for carts and bulls.

* A gala is a place where carts and bulls are kept.

The erection of these two new markets made it possible to abolish all the private stalls which were within a radius of one mile, in the case of meat stalls, and half mile, in the case of fish, of the public market. In place of these dirty stalls which were an eyesore and in which meat and fish used to be exposed to street dust and flies, beautiful stalls lined with impervious white tiles, and plentifully supplied with water have been provided.

The fish section has been provided with a refrigerating room in which a masonry ice box has been built for each stall-holder. The meat stalls have been provided each with a small teak-wood cabinet in which the butcher could put away out of sight his umbrella and articles of personal wear. The cabinet has a drawer in which money and papers could be kept, and the top could be used as a writing table.

The demand for fish and meat stalls at the Borella market was so great that it was found necessary to increase the number of stalls. On the other hand, at the Kotahena market a good number of fish and meat stalls remains unlet. At both markets a large number of vegetable stalls has not been let: this is due to the absence of any restriction against the sale of vegetables within a market area. Vegetables are sold in practically every little kadai in the neighbourhood of the public market, in a private garden, and even on the pavements, and as vendors of these articles find selling this way more profitable than going into the market and paying stall rents, all the vegetable stalls of the two new markets have not been let. It is however proposed to reduce the rents of these stalls very considerably so as to induce the vegetable sellers to come inside the market and ply their trade under modern sanitary conditions.

The gala accommodation at both markets has not been utilized to anything like the extent it was hoped it would be, when the markets were designed. This is due to the fact that carts bringing vegetables, &c., from the country, after unloading, go straight on to Pettah, the great trade centre of the town, to purchase rice, spices, poonac, oil, &c., which they carry back to the villages in the evening. The galas in Pettah are all crowded, and in fact more such accommodation is needed there. A small part of the gala at the Borella market is let to a seller of live poultry, and the larger portion is used as a stand for motor buses plying between Borella and Cotta and other villages. The gala at the Kotahena market is utilized to a small extent for keeping cattle.

In future the new markets will not be provided with galas, unless there is a distinct demand for them.

It is disappointing to see that none of the rat-proof grain stores at the Kotahena market has been taken. This is owing to the fact that cheaper boutiques, usually rat-infested structures of mud and wattle or cabook, are available in the bazaar area, and so long as there is no law to prohibit the sale of grain in such buildings, the modern rat-proof grain stores, built at great cost by the Municipality, will remain unoccupied.

A distinguished Sanitarian passing through Colombo visited both Borella and Kotahena markets in company with the writer, and expressed to him his great pleasure at seeing two such splendid markets which, he said, were a credit to the Colombo Municipality.

A new market for the Kollupitiya Ward is now under construction at Turret road to take the place of the existing small and primitive market at St. Michael's road, which is to be pulled down for the widening of this road.

A new market for the Slave Island Ward has been sanctioned, and its construction will be taken in hand this year.

As regards the old markets the following improvements or extensions were effected during the year.

Dean's Road Market.—Sunshades for two vegetable blocks.

Bambalapitiya Market.—Two stalls for the sale of offal.

Gasworks Street "Edinburgh" Market.—The bamboo tats over the green vegetable stalls were replaced by corrugatediron sheets, and an additional stall provided for the sale of green vegetables. Nine hydrant posts were provided for flushing the market.

The wood work of the meat stalls was repaired.

Kachcheri Road Market.—The bamboo tats over the plantain stalls were replaced by corrugatediron sheets, and five hydrant posts for flushing the market were provided.

St. John's Road Fish Market.—The great nuisance resulting from the droppings of the vast number of crows practically living all day inside this market was remedied by crow-proofing the whole market.

XII.—DAIRIES AND MILK SUPPLY.

During the year under review, 5 dairies were discontinued, and 6 new dairies were licensed, leaving a total of 47 at the end of the year, as against 46 at the end of 1922. The dairies in Colombo, with a few creditable exceptions, are conducted by a class of people who have no sanitary sense developed in them at all, and whose premises need very frequent inspection to prevent degeneration ; 1,079 inspections were done during the year, and 28 prosecutions were entered for keeping dairies in a filthy condition.

The number of unlicensed dairymen is undoubtedly on the increase, judging from the number of milch cattle one sees tethered in various private premises, Crown lands, Municipal parks, reclaimed lands, golf courses, &c. It is extremely difficult to deal with these men as they milk the cows before dawn, and let them out to graze in the various open spaces in the town. Most part of this milk, highly adulterated, sometimes with water from any pond or the lake, is sold to the various tea boutiques in the town long before the hour the most energetic and enthusiastic Inspector is out of bed. It is surprising that some of this milk is purchased by people who ought to know better, but who take no trouble to see that the milk they, and very often their young children, consume, comes from a reputable registered dairy. The purchase of milk, like other raw materials for the kitchen, is left to the discretion of some servant who purchases it from the man who is prepared to give him the highest commission. Needless to say the man who pays the highest commission, is the one who sells the worst milk. Not only do these illicit dairymen find purchasers for their milk, but they contrive, with the help of the butler or gardener, to find shelter for one or two cows on the premises at night with the avowed object of "milking the cow in the lady's presence." The lady of course cannot get up very early every day to watch such an uninteresting operation, and so she delegates the duty to the butler, whom she trusts, but who is really in the pay of the milkman.

In four cases we were successful in obtaining convictions for running unlicensed dairies, but the number of men owning two or three cows, which they keep in the open at night, and who are not licensed milk vendors, is very great.

The milk supply, on the whole, is adulterated. Of the 47 registered dairies in Colombo 22 had prosecutions for adulteration. During the year 1,020 samples of milk were taken, as against 1,022 in the previous year; and 202 samples or 19·8 per cent., as against 19 per cent. in the previous year, were found to be adulterated. The highest percentage of adulteration was 69 per cent.

The total amount of fines in respect of milk adulteration was Rs. 6,240 representing an average fine of Rs. 42·75. The highest fine inflicted was Rs. 100. In spite of these penalties, adulteration of milk is of frequent occurrence. A common dodge now practised by unlicensed dairymen is to get little boys to take the milk out for sale. When arrested and charged, these little boys are unable to pay the fine imposed, and as the Magistrate cannot send them to prison they escape with a caning, for which the unlicensed dairyman pays them a couple of rupees and himself escapes a big fine.

(7) *Milk, 1923.*

		1922.	1923.
Total number of samples taken	...	1,022	1,020
Number found adulterated	...	194	202
Percentage adulterated on the number taken	...	19·0	19·8
Highest percentage of adulteration	...	71	69
Total fines in respect of adulteration	...	Rs. 6,845	Rs. 6,240
Highest fine for adulteration	...	Rs. 75	Rs. 100
Average fine	...	Rs. 42·75	Rs. 42·75
Number of registered dairies	...	46	47
Number of dairies prosecuted for adulteration	...	18	22

XIII.—BAKERIES.

During 1923 2 bakeries were discontinued and 3 new licenses issued, leaving on the register a total of 49 at the end of the year, as against 48 at the end of the previous year. Of the two bakeries discontinued, the one at 182, Second Division, Maradana, was a very unsatisfactory place, and had a bad record of prosecutions against it. I am glad it has gone, as it was one of the very worst bakeries in Colombo. The 3 new bakeries are of a better type.

The old bakeries, which have been in existence for many years, are really small dwelling houses, which have been adapted to the needs of a bakery, and are naturally not so satisfactory as premises specially designed and built for the purpose. It is extremely difficult to get bakers to effect radical alterations to these old bakeries as they are not willing to spend money on buildings which, in the great majority of cases, are rented buildings. However, the bakeries on the whole are yearly improving, and thanks to the Ladies' League, bakers are taking a greater interest in the appearance and cleanliness of their bakeries. If the public took some interest in the establishments from which they get their bread, milk, &c., and occasionally paid a personal visit to them to see under what conditions the food they consumed was prepared and produced, and patronized only those establishments which maintained a uniformly high standard of cleanliness, bakers and dairymen would find that it pays better to keep their establishments clean, and that it is not only the Health Department that requires of them a high standard of cleanliness, but also their own clientele who would go elsewhere if the standard was lowered. The Sanitary Inspectors with their multifarious duties cannot inspect these establishments frequently enough, and as the public do not demand anything better, the proprietors of these establishments do not care to spend money on improvements and are content to go on in the same old way. Of the 49 bakeries, 26 had prosecutions against them during the year. The following were the offences:—

	Prosecutions.	Convictions.
Keeping bakery filthy	32	31
Keeping bakery utensils filthy...	1	1
Dirty workmen in bakery	12	12

XIV.—EATING-HOUSES AND TEA BOUTIQUES.

126 eating-houses were discontinued and 182 new licenses were issued during 1923, leaving a total of 569 on the register, as against 513 at the end of the previous year. The number of tea boutiques is very large, but as they are not registered or licensed, it is not possible to give their number.

The great majority of the eating-houses are small establishments which cater for the working classes and are generally run by people of the same class, so that the general appearance, internal arrangements, and general cleanliness are of a very low standard. Most of these establishments are partly used as dwelling houses and the public eating room is not infrequently used at night as a sleeping room, and it often communicates directly with living rooms and the kitchen, and with the bad lighting and ventilation generally obtaining, the pervading odour in these establishments is most unpleasant and certainly not conducive to the enjoyment of one's meal! To add to these defects, in most places, there is no water service laid on, which of course implies dirty floors, dirty furniture, dirty utensils and crockery, dirty conditions under which food is prepared for human consumption.

According to the definition given in the by-laws an eating-house is any house or place where cooked *rice* is *kept* (the italics are mine) for sale, so that the hundreds of places where food other than rice is kept for sale, and those places where food (including rice) is prepared for sale outside, but not *kept* and sold on the premises, escape registration, pay no license fee, though a great many of them do a lucrative business, and do not require to comply with even the few sanitary requirements laid down in the by-laws for eating-houses.

The definition of eating-houses as given in the by-laws is too narrow. A eating house should include any premises where any kind of food is prepared or supplied for consumption by the public either on the premises or elsewhere for the profit or gain of any person owning, or having an interest in, or managing such business.

As stated above, there is in Colombo a very large number of so-called tea boutiques where tea, coffee, sherbets, and various kinds of cooked food, except rice, sweetmeats, &c., are sold to the public, and which, in my opinion, should be licensed and subjected to a certain standard of sanitation. I have a very strong suspicion that the tea boutique is one of the factors in the spread of enteric fever, as a very large proportion of the working classes goes to these places for some, if not all, of their meals. The milk used in these establishments is highly adulterated, and if examined will, I have no doubt, show dangerous contamination. In these establishments food is invariably exposed to dust and flies, especially in the evening when Sanitary Inspectors are off duty: it is just left on the counter, uncovered, to be handled by every customer who helps himself to whatever he wants with dirty unwashed hands directly from the plate or leaf on which the food is placed.

During the year 364 prosecutions were entered for exposing food to dust and flies, and in every case a conviction was obtained, but the fines imposed would appear to have little deterrent effect; 96 prosecutions were entered for filthily kept eating-houses and 95 convictions obtained, 49 prosecutions were entered for running unlicensed eating-houses and 49 convictions obtained.

XV.—SLAUGHTER-HOUSE.

The following further improvements were effected to the slaughter-house during the year:—

Sheep Slaughtering House.—Drainage for the slaughter shed and a new water-closet provided.

Receiving Shed, Cattle Slaughter-house.—Drainage provided.

The slaughter-house is not up to date. The privately owned carts in which meat is transported from the slaughter-house to the various Municipal markets and private stalls in the town, though zinc-lined, are very unsatisfactory and primitive; the zinc-lining is often broken; the doors are ill-fitting, and being open at the top the meat is exposed to street dust and often to the public gaze. It would be a great improvement to have one or two covered, properly lined motor vans to transport the meat from the slaughter-house to the markets. These vans would transport the meat under sanitary conditions and expeditiously.

(8) *Slaughter-house Return, 1923.*

Number of neat cattle slaughtered	...	...	13,878
Number of buffaloes slaughtered	...	...	8,851
Number of sheep and goats slaughtered	...	...	58,688
Number of pigs slaughtered	...	...	2,194
Number of cattle rejected before slaughter	...	...	1,155
Number of cattle rejected owing to poor condition	...	...	1,128
Number of sheep and goats rejected	...	...	—
Number of cattle rejected after slaughter	...	...	60
Number of sheep and goats rejected after slaughter	...	...	—
Number of pigs rejected after slaughter	...	...	2

XVI.—OFFENSIVE AND DANGEROUS TRADES.

The statement below gives the number of offensive and dangerous trades registered during the year.

In accordance with the resolution of Council dated September 6, 1921, no new licenses were issued for the establishment of offensive and dangerous trades in the areas declared to be "residential areas."

(9) *Offensive and Dangerous Trades Registered during 1923.*

Ward.	Fibre Stores	Cotton Stores.	Straw Depôt.	Timber Depôt and Sawing Depôt.	Firewood Depôt.	Dyeing Houses.	Plumbago Stores and Curing yards.	Copra Stores.	Soap Manufactory.	Petroleum Stores.	Maldivine Fish Stores.	Poultry Marts.	Manure Stores.	Chekkus.	Aerated Water Factories.
Fort ...	...	5	—	—	—	—	—	—	—	—	—	—	—	—	—
Pettah ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
San Sebastian ...	—	—	4	—	—	—	—	—	—	—	—	—	—	—	—
St. Paul's ...	—	—	—	2	—	—	—	—	—	—	—	—	—	—	—
Kotahena ...	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mutwal ...	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—
New Bazaar ...	6	4	1	—	—	—	—	—	—	—	—	—	—	—	—
Maradana North ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Maradana South ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Dematagoda ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Slave Island ...	1	1	1	—	—	—	—	—	—	—	—	—	—	—	1
Kollupitiya ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cinnamon Gardens ...	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—
Bambalapitiya ...	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—
Timbirigasyaya ...	—	—	—	1	2	—	—	—	—	—	—	—	—	—	—
Wellawatta ...	—	—	—	—	—	3	—	—	—	—	—	—	—	—	—
Total ...	11	10	7	4	20	6	6	10	1	5	11	2	1	1	1

Aerated Water Factories.—One new factory was licensed during the year, making a total of 14 aerated water factories in the town at the end of the year.

The waters of three factories showed traces of copper on chemical examination, but the City Analyst was of opinion that the amount found was not harmful.

The proprietors of these establishments were written to and warned to get the cylinders relined. Two of them have done so and the amount of copper now found in the soda waters from these two establishments is so small as to be quite harmless. The other factory stopped the manufacture of waters and is still attending to the plant.

XVII.—MATERNITY AND CHILD WELFARE.

The staff consists of eleven Health Visitors and seven Midwives. They are attached to the four Municipal Dispensaries, and their work is supervised and directed by the Dispensary Medical Officers.

A whole time woman medical officer with a special training in maternity and child welfare work is needed to co-ordinate and supervise the work of the Health Visitors and Midwives, and to be in charge of Child Welfare Centres which, it is hoped, Council will be in a position to establish in the near future.

The reason why we have not succeeded in making a satisfactory reduction in the infant death-rate is, because of the great poverty of the working classes from whose ranks the greatest toll is taken. Advice without relief is to them like mustard without meat, and all the preaching and advice our staff gives is of little use, unless it can be accompanied by a certain amount of relief. The poor mothers by reason of their own physical condition cannot breast-feed their infants long enough to tide over the critical period of an infant's life, and are therefore driven to feed them either on the cheap imported skinned milks (if they can afford to buy even this), or on rice cunji and other foods totally unsuitable for an infant.

The Crèche, established by the Child Welfare Association, moved into its own building on November 16, 1923. It is situated behind the Public Health Department Office in Maligakanda park, and is a beautiful airy building built on modern sanitary lines. It is supplying a long-felt want, and the work done is greatly appreciated.

(10) *Work done by the Health Visitors.*

Number of visits paid to houses ...	...	132,643
Number of houses where instructions <i>re</i> infant feeding given ...	...	13,856
Number of visits to hand-fed children ...	...	2,740
Number of labour cases visited ...	...	451
Number of dispensary tickets issued ...	...	271

(11) *Infant Feeding.*

Year.	Visits at which Instructions re Infant Feeding given.	Visits to Hand-fed Children.	Remarks.
1910	590	...	(No record)
1911	1,784	...	(No record)
1912	1,858	...	609
1913	2,601	...	675
1914	1,661	...	619
1915	777	...	365
1916	3,283	...	865
1917	3,507	...	1,775
1918	3,150	...	589
1919	4,552	...	2,630
1920	6,786	...	1,920
1921	12,447	...	2,971
1922	11,350	...	2,408
1923	13,856	...	2,740
			Slave Island Dispensary only.
			Slave Island and St. Paul's Dispensaries.
			Slave Island, St. Paul's, and Maradana Dispensaries.
			Slave Island, St. Paul's, Maradana, and Modera Dispensaries.

(12) *Work of Municipal Midwives, 1906 to 1923.*

Year.	Total Births in Colombo.	No. of Confinements attended.	No. of Children Born.
1906	4,726	396	405
1907	4,280	476	479
1908	4,609	543	546
1909	4,589	567	571
1910	4,819	631	646
1911	5,280	615	623
1912	5,195	677	690
1913	5,693	661	668
1914	5,359	686	703
1915	5,641	638	653
1916	5,552	666	674
1917	5,860	662	671
1918	5,920	651	656
1919	5,907	560	562
1920	7,197	772	779
1921	8,724	743	749
1922	6,881	581	587
1923	7,107	565	572

(13) *Work done by Municipal Midwives, 1923.*

Number of confinements attended	...	...	565
Number of children born	...	...	572
Number of stillbirths	...	...	40
Number of deaths	...	...	13
Death-rate exclusive of stillbirths	...	...	2.3 per cent.

XVIII.—ANTI-MOSQUITO WORK.

Weather conditions last year were most favourable for the breeding of mosquitoes, and consequently, a very large number of complaints was received from all parts of the town. Queen's House was also badly invaded, and on investigation many of the gutters of the buildings in its vicinity were found to be breeding mosquitoes. The species found were chiefly stegomyia and culex, with a few migratory species. No malaria-carrying mosquitoes were found. In the great majority of cases, blocked or badly-sloped gutters were found to be the chief breeding places.

In addition to attending to complaints, the staff was engaged in its routine work of house-to-house inspection in the residential area.

The number of complaints received by this department has been steadily increasing, as the figures given below show. The public, with a few exceptions, take no interest in mosquito prevention and expect the Public Health Department to do everything for them. With the very small staff of 1 Sub-Inspector, 6 overseers, and 12 coolies, it is impossible to inspect all the premises in the town, and to destroy the breeding places. What is needed is legislation making householders and owners of property responsible for preventing the breeding of mosquitoes on their premises:—

Year.	No. of Complaints Received.
1917	45
1918	50
1919	64
1920	79
1921	53
1922	129
1923	123

(14) Anti-Mosquito Work, 1923.

(1) Complaints from Householders.

Number of complaints received	...	...	...	123
Number of premises visited	...	...	...	612
Number of potential breeding places found	...	...	...	22,892
Number of actual breeding places found	...	...	...	2,244

(2) General Inspection Work.

Number of premises visited	...	...	...	1,911
Number of tenements inspected	...	...	...	1,389
Number of potential breeding places found	...	...	...	2,9541
Number of actual breeding places found	...	...	...	1,751

(3) Summary.

Number of complaints received	...	...	...	123
Number of premises inspected	...	...	...	2,523
Number of tenements inspected	...	...	...	1,389
Number of potential breeding places found	...	...	...	52,433
Number of actual breeding places found	...	...	...	3,995

XIX.—LAUNDRIES.

No new Municipal Laundries were erected during the year. The question of erecting one at Polwatta for the dhobies washing on the Polwatta side of the lake was deferred for lack of funds.

The following improvements were effected during 1923 to the two Municipal Laundries.

Wekande Laundry.—Soiled-linen rooms were rat- and mice-proofed.

Blomendahl Laundry.—The remaining soiled-linen rooms 13 in number (18 had been done in the previous year), were provided with concrete tables.

Doors were rat- and mice-proofed.

There were 277 private laundries in the town distributed as shown in the statement below. These, for the most part, are established in three or four roomed dwelling houses in various parts of the town. Washing is done in the lake, canal, or at well sites. The water is usually highly polluted, and the whole business is conducted on primitive and unsanitary lines. Every effort is made by this department to get these establishments to comply with a minimum standard of sanitation by requiring the provision of separate rooms for soiled linen and clean linen, cementing floors and the walls of the rooms to a height of 6 feet, &c. The great defect is the quality of the water in which linen is washed. In most cases it is nothing but diluted sewage. This state of affairs can only be remedied by the provision by the Municipality of up-to-date laundries, like the two at Slave Island and Kotahena, in every ward of the city.

(15) Laundries in Colombo, 1923.

Ward.				No. of Laundries.
Fort	...	...	...	—
Pettah	...	...	...	—
San Sebastian	...	...	...	2
St. Paul's	...	...	...	2
Kotahena	...	...	...	9
Mutwal	...	...	...	24
New Bazaar	...	...	...	32
Maradana North	...	...	...	54
Maradana South	...	...	...	5
Dematagoda	...	...	...	34
Slave Island	...	...	...	13
Kollupitiya	...	...	...	38
Cinnamon Gardens	...	...	...	1
Bambalapitiya	...	...	...	11
Timbirigasyaya	...	...	...	18
Wellawatta	...	...	...	34
		Total	...	277

XX.—CLOSETS AND BATHS.

(a) *Premises Drained.*—During 1923, 356 new premises were drained to the sewers, including 153 premises drained in the endemic plague area, and of the 18,000 premises in the city separately assessed, 1,959 had been drained at the end of the year.

(b) *Private Closets.*—590 bucket-latrines were abolished and 779 water closets installed. The total number of bucket-latrines abolished since January, 1913, is 3,250.

(c) *Public Lavatories.*—One new public lavatory was opened to the public in 1923, and at the end of the year 45 were in use, including a total of 373 squatting places for men, 170 for women, 185 showers for men and 84 for women.

(d) *New Lavatories.*—Eleven new lavatories were sanctioned during 1923.

Cesspits.

The number of cesspits filled up and abolished during 1923 was 14. At the end of the year there were 151 distributed as shown in statement below, as against 165 at the end of the previous year :—

San Sebastian	...	...	115
St. Paul's	...	...	32
Kotahena	...	...	2
New Bazaar	...	...	2

XXI.—DISINFECTION STATION.

The two bullock drawn vans which were used for the transport of infected and clean linen to and from the disinfecting station were abolished, and instead two motor vans were supplied.

Six new London Fire Brigade pattern hand pumps were purchased at a cost of Rs. 397.74 for the disinfection of private premises.

- (a) *Number of Articles Disinfected at Equifex Steam Disinfector* : 3,708 pieces, representing 132 loads.
- (b) *Number of Premises Disinfected during 1923* : 4,887.
- (c) *Number of Premises Cleaned up by the Cleansing Gang* : 3,590.

(16) *Work done at the Steam Disinfection Station, 1923.*

Month.		Number of pieces disinfected.	Number of Loads.
January	...	565	12
February	...	459	15
March	...	521	16
April	...	180	6
May	...	305	13
June	...	271	10
July	...	95	5
August	...	262	11
September	...	178	5
October	...	310	14
November	...	196	11
December	...	366	14
		3,708	132

XXII.—GENERAL CEMETERIES.

*Improvements effected during 1923.**Kanatta Cemetery.*—

- (1) A Public Mortuary was erected at a cost of about Rs. 4,000. Such a building was very necessary for keeping bodies brought in too late for burial from ships or from outstations, and for keeping bodies of foreigners exhumed and awaiting transhipment to their native countries. Bodies exhumed for judicial inquiries could also be examined here.
- A charge of Rs. 5 for a day, or part of a day, is made for each body kept here.
- (2) The dry-earth closets at the Cemetery Office, the Cemetery Keeper's and Assistant Cemetery Keeper's bungalows, and the cooly lines were converted into water-closets.
- (3) A new servants' water-closet was built in the Assistant Cemetery Keeper's bungalow premises.
- (4) A wash basin with tap was provided in the public retiring room.

Madampitiya Cemetery.—

- (1) The entrance gateway which was 10 feet was widened to 13 feet 3 inches and new wooden gates were provided.
- (2) The open kitchens of the cooly lines were enclosed and new doors and locks provided.

XXIII.—MUNICIPAL DISPENSARIES.

There are four Municipal Dispensaries with a fully qualified Medical Officer in charge of each. Advice and medicines are given free to the poor. The subjoined tables show the work done at each :—

(17) *Work done at the Municipal Dispensaries.*(a) *Work done at Slave Island Dispensary, 1923.*

Number of patients treated	...	...	...	18,023
Number of visits by patients	...	...	...	35,602
Daily average attendance	...	...	...	98
Number of outdoor visits paid by the Medical Officer	...	...	...	151
Number of Municipal employees treated	...	...	...	37
Number of confinement cases visited by the Medical Officer	...	...	...	22
			Health Visitors.	
Number of visits paid to houses	...	...	...	39,445
Number of houses where instructions <i>re</i> infant feeding given	...	...	...	4,692
Number of visits to hand-fed children	...	...	...	1,073
Number of labour cases visited	...	...	...	134
Number of dispensary tickets issued	...	...	...	5

(b) *Work done at St. Paul's Dispensary, 1923.*

Number of patients treated	...	...	...	14,645
Number of visits by patients	...	...	...	22,435
Daily average attendance	...	...	...	61
Number of outdoor visits paid by the Medical Officer			...	192
Number of Municipal employees treated	...	...	...	29
Number of confinement cases visited by the Medical Officer	...		...	105

Health Visitors.

Number of visits paid to houses	...	...	...	46,472
Number of houses where instructions <i>re</i> infant feeding given			...	4,036
Number of visits to hand-fed children	...	...	...	548
Number of visits to labour cases visited	...	...	...	215
Number of dispensary tickets issued	...	...	...	137

(c) *Work done at the Maradana Dispensary, 1923.*

Number of patients treated	...	...	...	14,065
Number of visits by patients	...	...	...	24,189
Daily average attendance	...	...	...	66
Number of outdoor visits paid by the Medical Officer			...	—*
Number of Municipal employees treated	...	...	...	32
Number of confinement cases visited by the Medical Officer	...		...	—*

Health Visitors.

Number of visits paid to houses	...	...	...	28,543
Number of houses where instructions <i>re</i> infant feeding given			...	3,400
Number of visits to hand-fed children	...	...	...	965
Number of labour cases visited	...	...	...	43
Number of dispensary tickets issued	...	...	...	112

(d) *Work done at the Modera Dispensary, 1923.*

Number of patients treated	...	...	...	14,129
Number of visits by patients	...	...	...	22,089
Daily average attendance	...	...	...	61
Number of outdoor visits paid by the Medical Officer			...	88
Number of Municipal employees treated	...	...	...	60
Number of confinement cases visited by the Medical Officer	...		...	10

Health Visitors.

Number of visits paid to houses	...	...	...	18,183
Number of houses where instructions <i>re</i> infant feeding given			...	1,728
Number of visits to hand-fed children	...	...	...	154
Number of labour cases visited	...	...	...	59
Number of dispensary tickets issued	...	...	...	17

* Owing to the absence of the Medical Officer on leave these figures could not be obtained.

XXIV.—ENTERIC HOSPITAL.

For the report of the Medical Officer in charge of the Municipal Enteric Hospital *vide* Annexure A.

Segregation Camp.

The Apothecary of the Municipal Enteric Hospital is the overseer of the Camp, and the Medical Officer of the Municipal Enteric Hospital is in medical charge of the Camp.

(18) *Segregation Camp.*

Number of contacts segregated during 1923.

Disease.	Contacts from the Town,		Contacts from outside limits.	Total.
Plague ...	655	...	68	723
Smallpox ...	4	...	93	97
Total ...	659		161	820

Part II.—General.

Vital Statistics.

XXV.—METEOROLOGY.

Temperature.—The mean temperature for the year was 80.5 as compared with 80.7 the average mean for the last sixteen years. The monthly mean temperature ranged from a minimum of 78.9 in February to a maximum of 82.8 in April. It fell below 80 during the months of January, February, and December.

(19) *Statistics.*

(Supplied by the Superintendent of the Colombo Observatory.)

(a) Average Monthly Mean Temperature at Colombo Observatory (Cinnamon Gardens).

16 Years.

		° F
January	...	79.1
February	...	79.7
March	...	81.4
April	...	82.6
May	...	82.6
June	...	81.6
July	...	81.0
August	...	81.0
September	...	81.0
October	...	80.2
November	...	79.6
December	...	79.0
Year	...	80.7

(d) Monthly Mean Pressure at Colombo Observatory during 1923 (reduced to Standard Gravity and Mean Sea Level).

(b) Monthly Mean Temperature at Colombo Observatory during 1923.

(e) Average Monthly Rainfall at Colombo Observatory (Cinnamon Gardens).

16 Years.

		° F
January	...	79.4
February	...	78.9
March	...	81.2
April	...	82.8
May	...	82.5
June	...	81.2
July	...	80.2
August	...	80.6
September	...	80.6
October	...	80.1
November	...	80.0
December	...	79.0
Year	...	80.5

(c) Average Monthly Mean Pressure at Colombo Observatory (Cinnamon Gardens) reduced to Standard Gravity and Mean Sea Level).

12 Years.

		Inches.
January	...	29.865
February	...	29.856
March	...	29.838
April	...	29.802
May	...	29.784
June	...	29.781
July	...	29.797
August	...	29.814
September	...	29.821
October	...	29.830
November	...	29.826
December	...	29.844
Year	...	29.822

(f) Monthly Rainfall at Colombo Observatory (Cinnamon Gardens) and Colombo Fort during 1923. (Observatory Gauge 25 Feet and Fort 70 Feet above Mean Sea Level).

		Inches.
January	...	29.836
February	...	29.844
March	...	29.849
April	...	29.758
May	...	29.784
June	...	29.794
July	...	29.806
August	...	29.830
September	...	29.814
October	...	29.832
November	...	29.840
December	...	29.823
Year	...	29.818

		Inches.
January	...	3.56
February	...	1.72
March	...	4.08
April	...	7.78
May	...	12.41
June	...	7.78
July	...	6.01
August	...	2.94
September	...	5.29
October	...	13.00
November	...	11.09
December	...	4.84
Year	...	80.50

(g) Average Monthly Mean Humidity at Colombo Observatory (Cinnamon Gardens).

(h) Monthly Mean Humidity at Colombo Observatory during 1923.

		15 Years.	Per Cent.
January	76
February	76
March	78
April	79
May	80
June	81
July	81
August	80
September	80
October	83
November	82
December	79
Year	80

		Per Cent.
January
February
March
April
May
June
July
August
September
October
November
December
Year

		Per Cent.
January	...	80
February	...	78
March	...	79
April	...	77
May	...	77
June	...	82
July	...	82
August	...	81
September	...	82
October	...	84
November	...	82
December	...	82
Year	...	81

With reference to the rainfall at Fort, it should be noted that this gauge is not only higher above sea level, but higher above adjacent ground level, and for this its readings might be expected to be less than those of a gauge at or near ground level. The difference between it and the readings at the Observatory is thus not purely a climatic one, but largely a matter of the exposure of the two gauges.

The Observatory gauge should be taken as the standard.

The humidity in tables (g) and (h) is the mean of the humidities derived from the maximum both dry and wet, and the minimum dry and wet.

Rainfall.—A total of 95.43 inches of rainfall was recorded at the Colombo Observatory during the year, as against 87.82 during the previous year, and 80.50 the average for the previous sixteen years. This is the highest rainfall recorded for Colombo since 1915 when a total of 96.81 inches was recorded. The monthly record varied from a minimum of 0.01 inches in February to a maximum of 13.61 inches in September. The highest record for any twenty-four hours was 2.98 inches on December 17.

XXVI.—POPULATION.

The population of Colombo as estimated to the middle of the year on the basis of the ratio of intercensal increase was 250,433, but this population, as already explained in section 2 of the Report for 1921, is far short of the actual. A new estimate on the assumption that the town has now recovered from the economic depression which resulted from the War and its consequences, was made on the basis of the old estimates prior to the taking of the census. The population thus estimated was 300,924, which nearly tallies with the figure given in the Report for 1922. This population was however not used in the calculation of the various rates, but only to confirm the theory that the high birth- and death-rates as disclosed when calculated on the basis of the census figures cannot be relied upon.

(20) *Population by Race.*

Race.		Population enumerated at the Census of March, 1921.	Population estimated to middle of 1923.
All Races	...	244,163	250,433
Europeans	...	2,836	2,909
Burghers	...	14,863	15,245
Sinhalese	...	114,600	117,543
Tamils	...	54,153	55,544
Moors	...	39,692	40,711
Malays	...	5,852	6,002
Others	...	12,167	12,479

(21) *Area and Estimated Population, 1923.*

Ward.	Total area in Acres.	Estimated Population.	Density per Acre.
Fort	237	2,759	11.6
Pettah	129	7,796	60.4
San Sebastian	121	11,787	97.4
St. Paul's	157	23,996	152.8
Kotahena	1,716	47,357	27.6
New Bazaar	289	23,940	82.8
Maradana	1,773	59,006	33.2
Slave Island	322	22,118	68.6
Kollupitiya	1,465	24,362	16.6
Wellawatta	2,061	27,312	13.2
The Lake	317	—	—
Total	8,587	250,433	29.2

XXVII.—BIRTHS.

There were 7,107 births registered during the year, representing a birth-rate of 28.4, as against 26.0 the average for the previous ten years. The rate is higher than that of 1922, but lower than those of 1920 and 1921 when the unusually high birth-rates, as pointed out in previous reports, were recorded.

Of the races, the highest rate, 40.8, was recorded as usual amongst the Malays as against their average 40.6. Then came the Sinhalese with a rate of 36.7 as against the average 32.5, followed closely by the Burghers and Europeans with rates 33.1 and 32.0 as against their average 33.7 and 24.6 respectively. The European rate is especially noteworthy in that it is the highest rate so far recorded for that Race.

(22) *Births—Racial Birth-rates.*

Race.	Average Rate per 1,000 population. 1913 to 1922.	Births, 1923.	Birth-rate per 1,000 Population, 1923.
All Races	26.0	7,107	28.4
Europeans	24.6	93	32.0
Burghers	33.7	505	33.1
Sinhalese	32.5	4,311	36.7
Tamils	14.8	954	17.2
Moors	22.2	855	21.0
Malays	40.6	245	40.8
Others	11.4	144	11.5

CHART. I

BIRTH- RATE. 1903-1923

PER CENT. ABOVE MEAN.

MEAN.

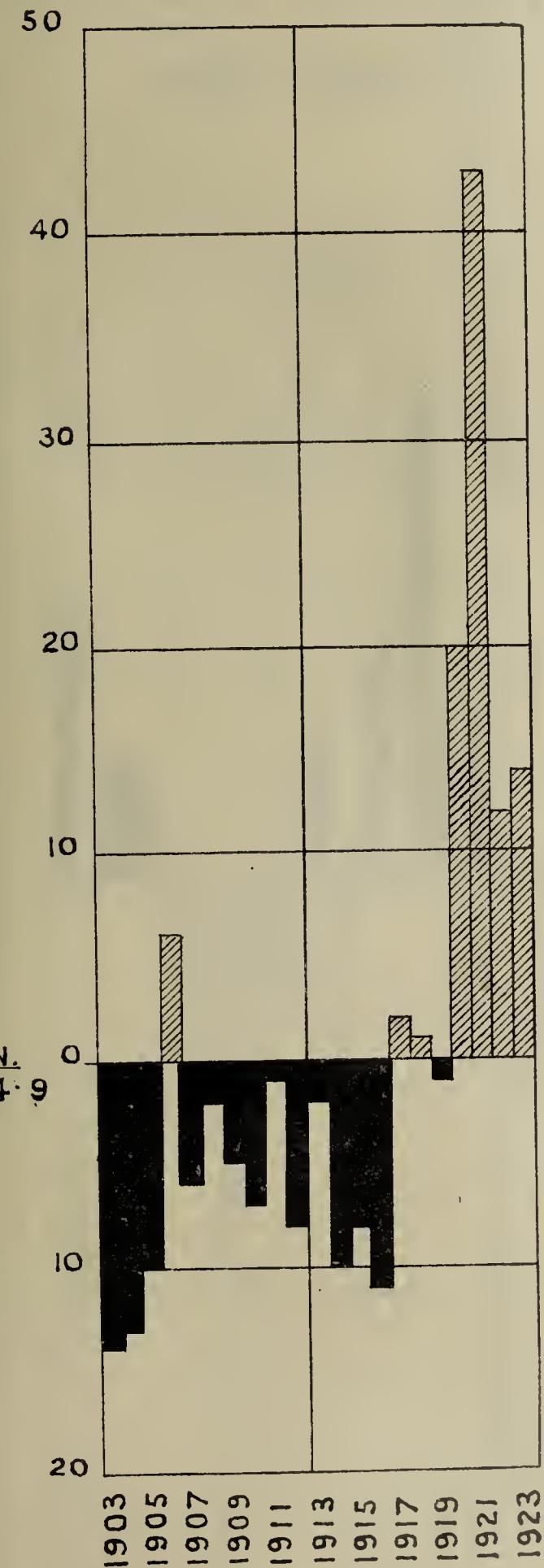


CHART I

BIRTH COIN STATE - HAWAII

MAXIMUM QUANTITY PER DAY

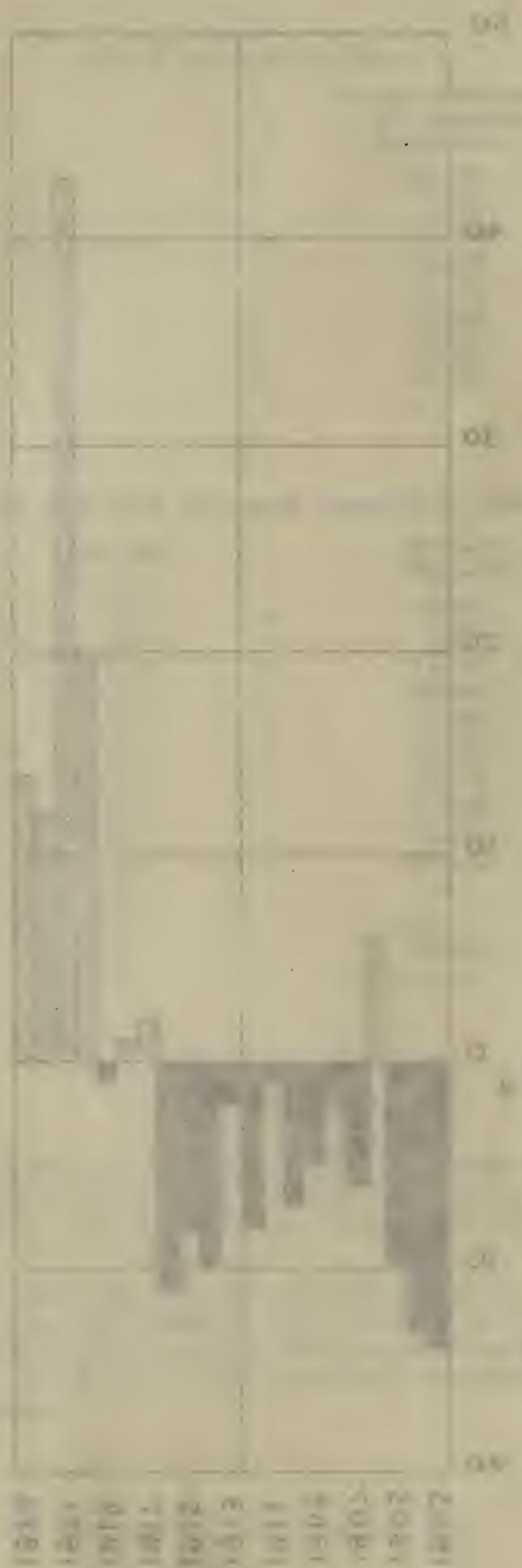
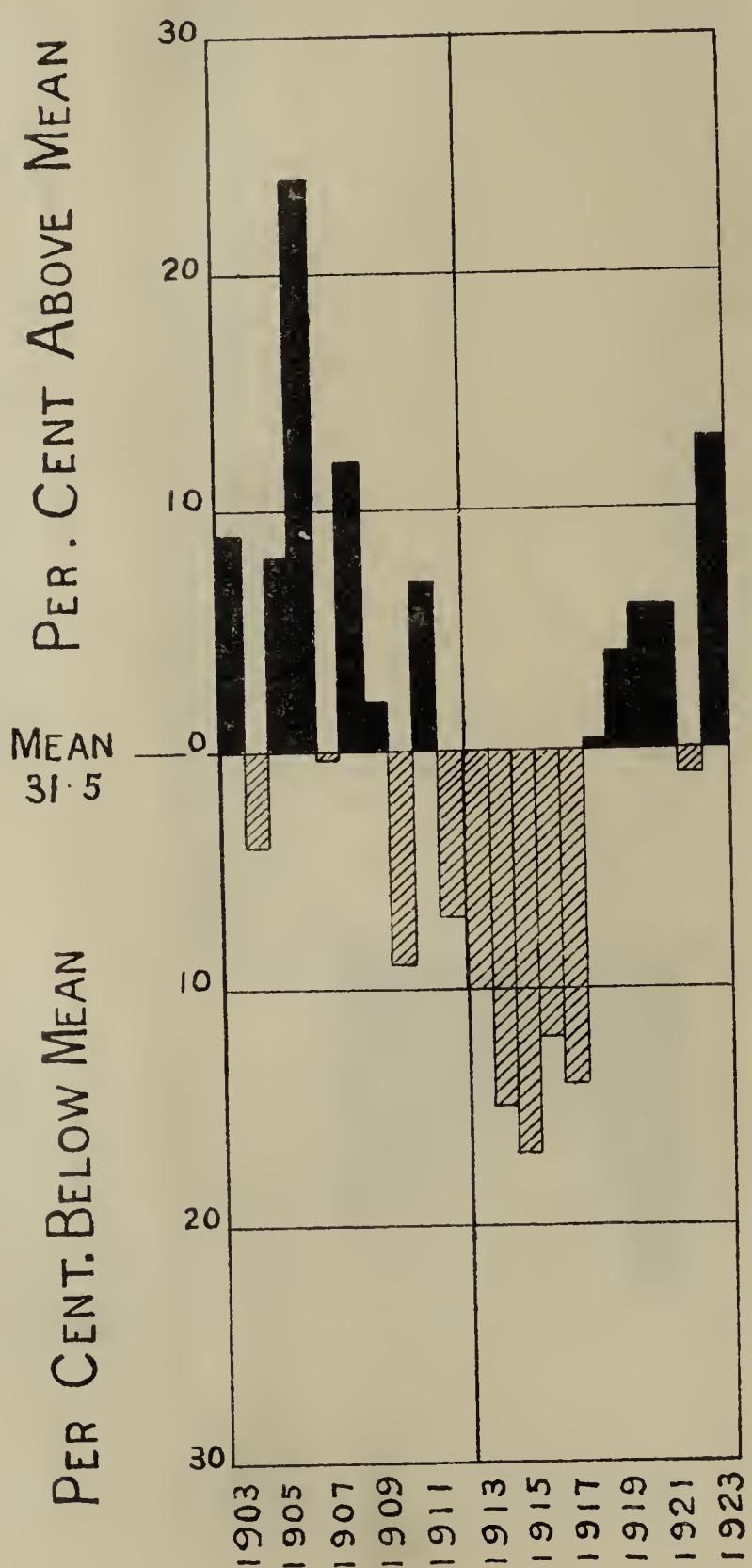


CHART. II

DEATH - RATE ALL CAUSES
1903 - 1923



(23) *Ward Birth-rates.*

Ward.	Average Rate per 1,000 Population, 1913 to 1922.		Births, 1923.		Birth-rate per 1,000 Population, 1923.
Colombo	26.0	...	7,107	...	28.4
Fort	2.6	...	3	...	1.1
Pettah	4.4	...	30	...	3.8
San Sebastian	20.3	...	192	...	16.3
St. Paul's	18.4	...	404	...	16.8
Kotahena	23.8	{	636	...	22.6
Mutwal	23.2	{	433	...	21.1
New Bazaar	23.2	{	505	...	21.1
Maradana North	19.9	{	402	...	19.9
Maradana South	19.9	{	321	...	19.9
Dematagoda	449				
Slave Island	25.1	...	515	...	23.3
Kollupitiya	19.5	{	229	...	13.2
Cinnamon Gardens	19.5	{	93	...	13.2
Bambalapitiya	15.7	{	153	...	22.1
Timbirigasyaya	15.7	{	185	...	22.1
Wellawatta	26.6	...	266	...	—
Hospitals	—	...	2,291	...	—

XXVIII.—DEATHS.

(a) *General Death-rate.*

There were 8,893 deaths registered during the year, representing a crude death-rate of 35.5, as against the average for the preceding ten years of 29.8. It is rather disquieting to record that the crude death-rate for the year was higher than that of any other year of the decennium, but as explained under the section dealing with population, the rate cannot be relied upon as it was calculated on a population much lower than the actual, and had it been calculated on the estimates prior to the taking of the Census, the rate would have been reduced to 29.6 a quite satisfactory one.

A very large number of non-residents who come and die in the town is included in these deaths, but only those who die in hospitals and whose residence has been ascertained to be distinctly outside Colombo, can be excluded from them. There were 1,100 deaths of non-residents who died in the hospitals; excluding them the death-rate was 31.1 or 25.9 when corrected for the deficiency in population, as against 26.8 for the previous year. Pneumonia is still the prime contributory cause of the general death-rate due to a great extent to the prevalence of influenza.

(b) *Ward Death-rates.*

When corrected for deaths in hospitals the ward with the highest death-rate was Slave Island (37.8), as against 29.0 during the previous year, followed closely by New Bazaar with a rate of 37.7, as against 33.2 during the previous year. St. Paul's too had a high rate of 33.8, as against 29.4 of the previous year. The ward with the lowest rate, exclusive of the non-residential wards Fort and Pettah, was, as usual, Kollupitiya and Wellawatta, with a rate 20.5 and 20.9, as against 17.3 and 16.4 of the previous year respectively. Of the residential wards these two wards have the lowest density of population.

(24) *Colombo Ward Death-rates (all Causes) in 1923. Death-rate per 1,000 Population.*

Ward.	Average Crude Death-rate, 1913 to 1922.	Deaths, 1923.	Death-rate (Crude), 1923.	Death-rate corrected for Deaths in Hospitals, 1923.	Death-rate for Deaths in Hospitals, 1923.	Increase or Decrease, 1923, as compared with the previous year.
Colombo	29.8	8,893*	35.5	31.1	26.8	+ 4.3
Fort	12.9	22	8.0	10.9	11.4	— .5
Pettah	9.6	93	11.9	20.9	17.1	+ 3.8
San Sebastian	23.2	276	23.4	29.1	31.3	— 2.2
St. Paul's	24.8	665	27.7	33.8	29.4	+ 4.4
Kotahena	22.7	723	25.4	30.6	28.4	+ 2.2
Mutwal	22.7	478	25.4	30.6	28.4	+ 2.2
New Bazaar	25.7	714	29.8	37.7	33.2	+ 4.5
Maradana North	509					
Maradana South	20.3	402	22.3	30.7	25.7	+ 5.0
Dematagoda	402					
Slave Island	24.9	693	31.3	37.8	29.0	+ 8.8
Kollupitiya	18.9	201	17.1	20.5	17.3	+ 3.2
Cinnamon Gardens	216					
Bambalapitiya	9.1					
Timbirigasyaya	10.3	155	15.3	20.9	16.4	+ 4.5
Wellawatta	172					
Hospitals	—	3,081	—	—	—	—

* Inclusive of 1,100 deaths of non-residents of the town.

(c) *Race Death-rates.*

The highest death-rate was, as usual, recorded amongst the Malays, 46.0, as against 36.4 the average for the preceding ten years and 38.6 the rate for the previous year. Next come the Sinhalese with a rate of 41.3, as against 33.0 the rate for the preceding ten years. The lowest rate was amongst the Europeans 15.5, as against 17.4 the average. The Burghers, too, had a satisfactorily low rate of 24.0, as against the average 23.4.

(25) Colombo Racial Death-rates (all Causes) in 1923.

Race.	Average Crude Death-rate, 1913 to 1922.	Deaths, 1923.	Crude Death-rate, 1923.	Rate corrected for Deaths in Institutions.	Increase or Decrease on the Average (Crude).	Decrease due to correction for Institutions.	Rate further corrected for Age and Sex.
All Races...	29.8	8,893	35.5	31.1	+ 5.7	4.4	35.1
Europeans.	17.4	45	15.5	12.7	- 1.9	2.8	...
Burghers...	23.4	366	24.0	23.3	+ .6	.7	...
Sinhalese ..	33.0	4,856	41.3	33.2	+ 8.3	8.1	...
Tamils ...	26.8	1,659	29.9	28.2	+ 3.1	1.7	...
Moors ...	28.3	1,366	33.6	33.4	+ 5.3	.2	...
Malays ...	36.4	276	46.0	45.8	+ 9.6	.2	...
Others ...	27.1	325	26.0	23.9	- 1.1	2.1	...

XXIX.—PRINCIPAL CAUSES OF DEATHS.

(26) Principal Causes of Deaths at All Ages in 1923.

Cause of Death.	No. of Deaths.
*Pulmonary Tuberculosis	727
Abdominal Tuberculosis	15
Tuberculous meningitis	7
Tuberculosis of spine	1
Tuberculosis of intestines	4
Tubercular peritonitis	6
Tubercular abscess	3
Tubercular diarrhoea	2
Tubercular pleurisy	2
Tubercular meningo encephalitis	1
Tubercular laryngitis	1
Tubercular enteritis	1
Tubercular caries	1
Tubercular adenitis	1
Disseminate tuberculosis	5
Tuberculosis of organs not specified	59
Pneumonia ...	1,251
Bronchitis ...	188
Diarrhoea ...	215
Enteritis ...	466
Dysentery ...	309
*Enteric Fever	269
Malaria { Intermittent fever ...	2
Malaria { Remittent fever ...	136
Malaria { Malarial cachexia ...	28
Simple and ill-defined fever ...	166
*Plague ...	472
Debility ...	990
Influenza ...	Total diarrhoeal.
Infantile convulsions ...	37
	204
	492
	317
	480

* Those marked with an asterisk are notifiable infectious diseases.

Certain Minor Causes of Deaths.

Anchylostomiasis	...	...	...	135
Intestinal parasites	...	...	...	171
Paralysis	...	...	...	119
Rickets	...	...	...	49
Cancer	...	...	...	76
Tetanus	...	...	...	59
*Measles	...	...	...	16
*Diphtheria	...	...	...	7
Whooping cough	...	...	...	5
Rabies	...	...	...	3
*Smallpox	...	...	...	1
Beri-beri	...	...	...	—

* Those marked with an asterisk are notifiable infectious diseases.

As the above statement shows, pneumonia again takes the highest toll, being followed by phthisis, debility, infantile convulsions, enteritis, influenza, dysentery, enteric, diarrhoea, and plague.

Bronchitis shows a decreased mortality compared with 1922. Phthisis, diarrhoea, debility, and infantile convulsions show a decreased mortality compared with 1921.

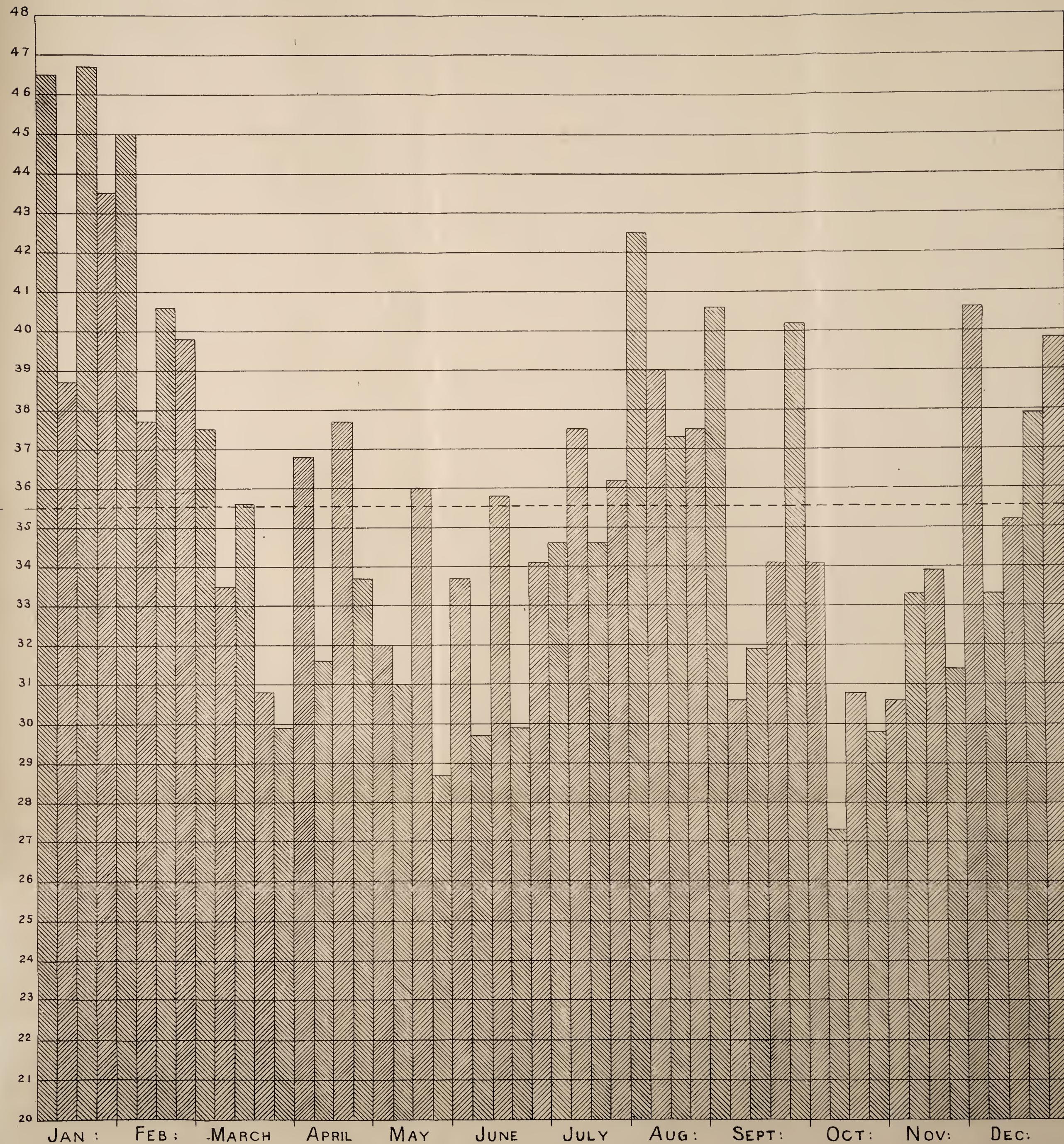
Of the 8,893 total deaths due to all causes 1,929 or 23 per cent. were deaths of infants under one year of age; in other words, nearly $\frac{1}{4}$ of all the deaths in Colombo were of infants under one year of age.

The following table shows the part infantile mortality plays in sending up the death rate.

	Total Deaths.	Deaths of Infants under 1 year.	Percentage.
Pneumonia ...	1,251	194	16 per cent.
Bronchitis ...	188	69	37 per cent.
Diarrhoea and enteritis ...	681	213	31 per cent.
Debility ...	492	364	74 per cent.
Infantile convulsions ...	480	480	100 per cent.

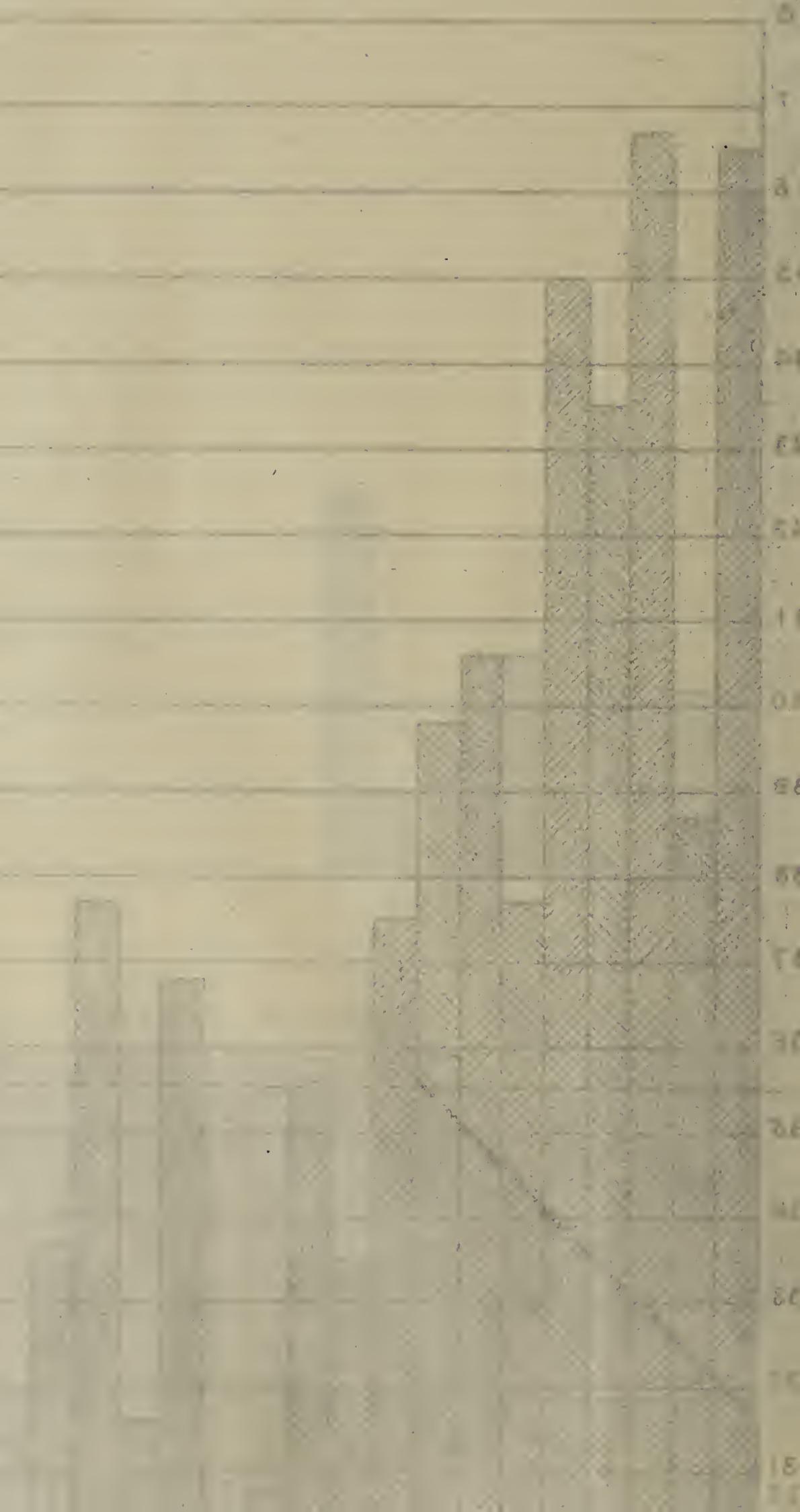
CHART. III

WEEKLY DEATH RATE ALL CAUSES 1923



32W 1st fl. Au. GANEE

1823



ЧИТАНІ

УПЛАТЯМО ТИГІНІ

1903-1953



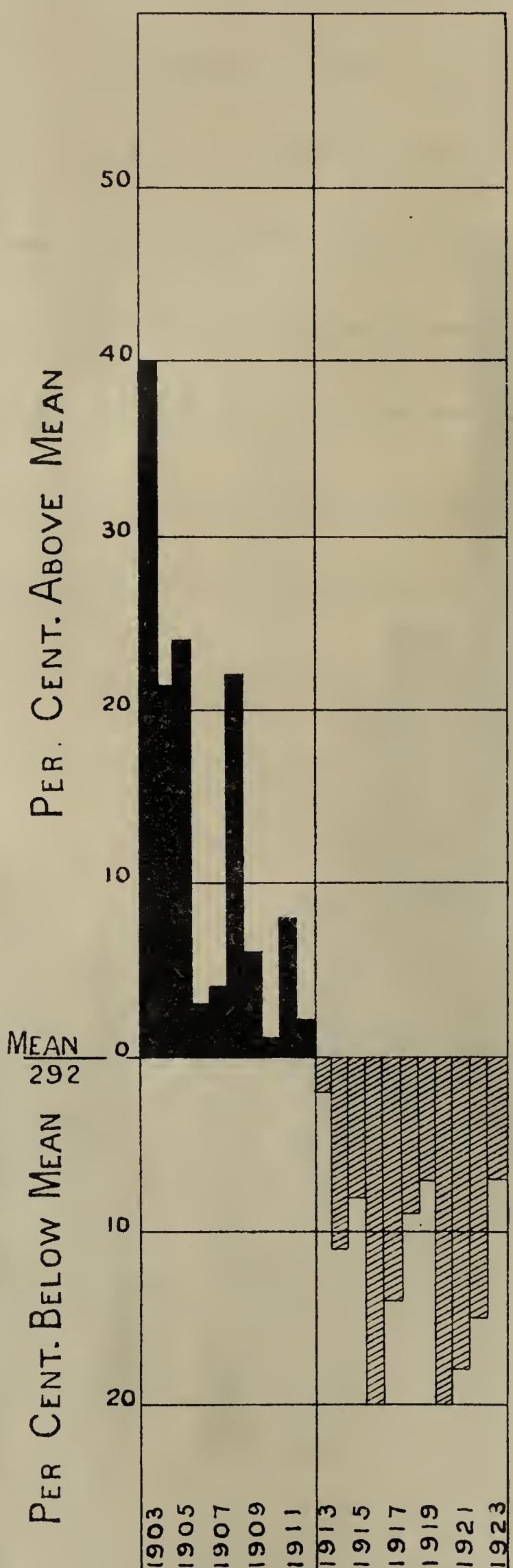
УПЛАТЯМО ТИГІНІ

УПЛАТЯМО ТИГІНІ

CHART. IV

INFANT MORTALITY

1903-1923



XXX.—INFANT MORTALITY.

Total deaths 1,929 ; death-rate 271 per thousand births as against the average rate during the previous ten years of 254.

Out of 7,107 children born alive,

475 or 7 per cent. died within the first week,
786 or 11 per cent. died within the first month,
1,567 or 22 per cent. died within the six months,
1,929 or 27 per cent. died within the first year.

Out of the 1,929 total deaths,

480 or 25 per cent. died of convulsions,
460 or 24 per cent. died of atrophy and debility,
213 or 12 per cent. died of diarrhoea,
203 or 11 per cent. died of premature birth,
194 or 10 per cent. died of pneumonia.

As the above statement shows, the principal causes of death were convulsions, atrophy, and debility, diarrhoea, premature birth, and pneumonia.

Convulsions.—323 or 67 per cent. of the deaths from this cause occurred in the first three months of life. Convulsions are due to a variety of causes ; some of them are ante-natal and beyond our control ; the other causes are prolonged labour, neglect of the child in the early days due to ignorance, inexperience, or carelessness of the mother, constipation, improper feeding, &c.

Of the 475 deaths in the first week, 313 or 66 per cent. were due to premature birth and debility, and of the 786 deaths in the first month 449 or 57 per cent. were due to the same causes, so that it will be seen that the high mortality in the first week and first month is mainly due to premature birth and debility, causes which are preventable to a great extent. The excessive mortality from these two causes is undoubtedly due to the insanitary conditions under which the mother lives, her poverty, which implies insufficient and poor quality of food, employment during pregnancy, very early weaning, and improper feeding of the child.

The high mortality from diarrhoeal diseases is chiefly due to artificial feeding with unsuitable substitutes for human milk, and also to infection of the child's food by flies, or dirty feeding bottles, pacifiers, and to the dirty conditions under which the child is brought up.

The mortality from pneumonia is due to living in stuffy, ill-ventilated rooms where fresh air and sunlight cannot penetrate, exposure, and to feeble vitality.

In Colombo the two most important factors in the causation of a high infant mortality are, (1) the wretched housing conditions of the poor, (2) poverty which compels the pregnant mother to work practically up to the last week of pregnancy and soon after the birth of the child, and which drives her to feed her child on cheap, unsuitable foods which alone she can afford to purchase.

(27) *Infant Mortality, 1923, by Wards. Rate per 1,000 Births.*

Ward.	Average. 1913 to 1922.	1923.	Increase or Decrease.
Colombo	254	271	+ 17
Fort	279	—	-279
Pettah	340	400	+ 60
San Sebastian	349	339	- 10
St. Paul's	392	455	+ 63
Kotahena	262	318 302	+ 40
Mutwal	356	279	+ 46
New Bazaar	378	402	+ 28
Maradana North	297	305 325	+ 28
Maradana South	296	—	
Dematagoda	278	346	+ 68
Slave Island	209	231 227	+ 18
Kollupitiya	209	215	+ 18
Cinnamon Gardens	196	243 208	+ 6
Bambalapitiya	202	192	
Timbiringasyaya	—	—	
Wellawatta	137	167	+ 30
Hospitals	—	—	

(28) *Infant Mortality, 1923, by Races. Rate per 1,000 Births.*

	All Races.	Europeans.	Burghers.	Sinhalese.	Tamils.	Moors.	Malays.	Others.
All causes	271	65	180	254	354	331	294	313
Premature birth	28	21	10	37	22	11	4	21
Atrophy and debility.	65	—	30	52	108	93	106	90
Bronchitis	10	—	15	8	15	15	—	7
Pneumonia	27	—	24	28	22	31	41	35
Diarrhoeal	30	11	30	28	30	36	49	42
Convulsions	67	11	43	52	114	118	53	69
Tetanus	1	—	—	1	3	—	4	7
All other causes	43	22	28	48	40	27	37	42

XXXI.—INFECTIOUS DISEASES.

The following statement shows the number of cases of each of the notifiable diseases reported during each month of the year.

(29) *Notifiable Infectious Diseases, 1923.*

Disease.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total for Colombo, exclusive of Port and outside cases.	Port Cases.	Cases from outside limits.	Grand Total of Cases.
Plague ...	28	32	11	17	9	10	21	23	26	12	13	28	230	—	5	235
Cholera ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Smallpox ...	—	2	1	—	—	—	—	—	—	—	—	—	3	5	24	32
Chickenpox ...	156	144	175	149	132	64	38	42	62	100	98	75	1,235	4	76	1,315
Measles ...	97	115	167	116	71	39	46	45	29	22	9	5	761	1	27	789
Diphtheria ...	3	2	1	1	1	3	2	1	—	5	—	—	19	—	8	27
Acute Diarrhoea	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	1
Enteric fever ...	64	31	36	37	54	19	42	63	42	54	62	31	535	14	192	741
Continued fever ...	10	6	7	6	7	6	7	8	12	17	13	6	105	—	5	110
Phthisis ...	124	104	93	99	112	86	107	118	115	150	127	108	1,343	3	240	1,586
Scarlet fever ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Typhus fever ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total ...	482	436	491	425	386	227	264	300	286	360	322	253	4,232	27	577	4,836

XXXII.—PULMONARY GROUP OF DISEASES.

Under this heading are included pneumonia, phthisis, and bronchitis, of which only phthisis is notifiable.

(a) *Pneumonia*.—Deaths 1,251; death-rate 5'00 per mille. Of the 1,251 deaths, 173 were outside cases, and 194 or 16 per cent. were deaths of infants under one year of age.

Pneumonia is one of the most fatal of all acute diseases; it claimed the highest number of deaths during 1923; 14 per cent. of all deaths in Colombo were due to this disease. It was prevalent throughout the year with a marked increase during the first five months, and again in the month of September. Pneumonia is an infectious disease which is spread from person to person through the secretions of the mouth and nose, and overcrowding naturally favours contact infection. Its excessive prevalence in Colombo is due to a large proportion of the inhabitants living in overcrowded, ill-ventilated, stuffy rooms, and to other predisposing causes, such as chills, exposure, dusty atmosphere, poor and insufficient food, alcohol, and anything that tends to lower the vitality. Influenza was again undoubtedly responsible for the increased mortality.

(b) *Phthisis*.—727 deaths as against 640 in the previous year. 1,586 cases were reported during the year, of which 1,340 were town cases, 3 Port cases, and 240 outside cases. The Malays as usual had the highest death-rate.

Spot map "A" shows the distribution in the town; naturally the most crowded and insanitary areas of the town show the largest number of cases. Next to pneumonia, phthisis claims the highest number of deaths. In Ceylon the disease is mainly spread from man to man through direct association; infection through infected milk is practically unknown. It is a disease fostered by overcrowding, bad lighting and ventilation of living rooms, dust, &c., and nine-tenths of the tenement dwellers of Colombo live under these conditions. Improved housing conditions diminish the incidence to phthisis by reducing the chances of contact infection, providing more light, purer air and sunshine in houses, and generally raising the standard of cleanliness. Other measures are also necessary, such as early diagnosis and notification, segregation of sick, proper disinfection and disposal of sputum, medical inspection of workmen in factories, education of the public, the after care of cured cases, &c. Many cases which have improved under treatment or been completely cured and discharged from hospital or sanatorium return to their wretched homes to get re-infected and die. The most important preventive measures therefore are, the improvement of the housing conditions, and the after-care of patients. With the steady increase of population, the housing problem becomes aggravated and more and more difficult to solve every year, and the poor are hard put to it to find any kind of accommodation within a reasonable distance of their work places. We cannot look to private enterprise to solve this problem, as people do not like to invest money on tenement properties owing to the poor return they get for their money, and so it becomes the duty of the Government, the Municipality, and other employers of large labour forces, to provide sanitary dwellings for their workmen. The Council has already made a start in a small way, and it is hoped that the others will follow suit.

Dust is another important factor in the spread of phthisis; in the districts in which the poor live, the streets are deep in dust, and it is not only a nuisance, but a serious menace to the health of the people.

(c) *Bronchitis*.—Deaths 188; death-rate 0'75 per mille. Of the 188 deaths 69 or 37 per cent. were of infants under one year of age.

Bronchitis shows a decrease compared with the previous year.

(30) *Pulmonary Diseases, 1923, by Race. Rate per 1,000 Population.*

	All Races.	Europeans.	Burghers.	Sinhalese.	Tamils.	Moors.	Malays.	Others.
Phthisis ...	Deaths ...	727	2	29	378	137	122	27 ... 32
	Death-rate ...	2'90	0'69	1'90	3'21	2'46	3'00	4'50 ... 2'56
Pneumonia ...	Deaths ...	1,251	2	43	716	231	163	43 ... 53
	Death-rate ...	5'00	0'69	2'82	6'09	4'16	4'00	7'17 ... 4'25
Bronchitis ...	Deaths ...	188	—	14	89	42	34	2 ... 7
	Death-rate ...	0'75	—	0'92	0'75	0'76	0'84	0'33 ... 0'56
All pulmonary ...	Deaths ...	2,166	4	86	1,183	410	319	72 ... 92
	Death-rate ...	8'65	1'38	5'64	10'06	7'38	7'84	12'00 ... 7'37

CHART. V.

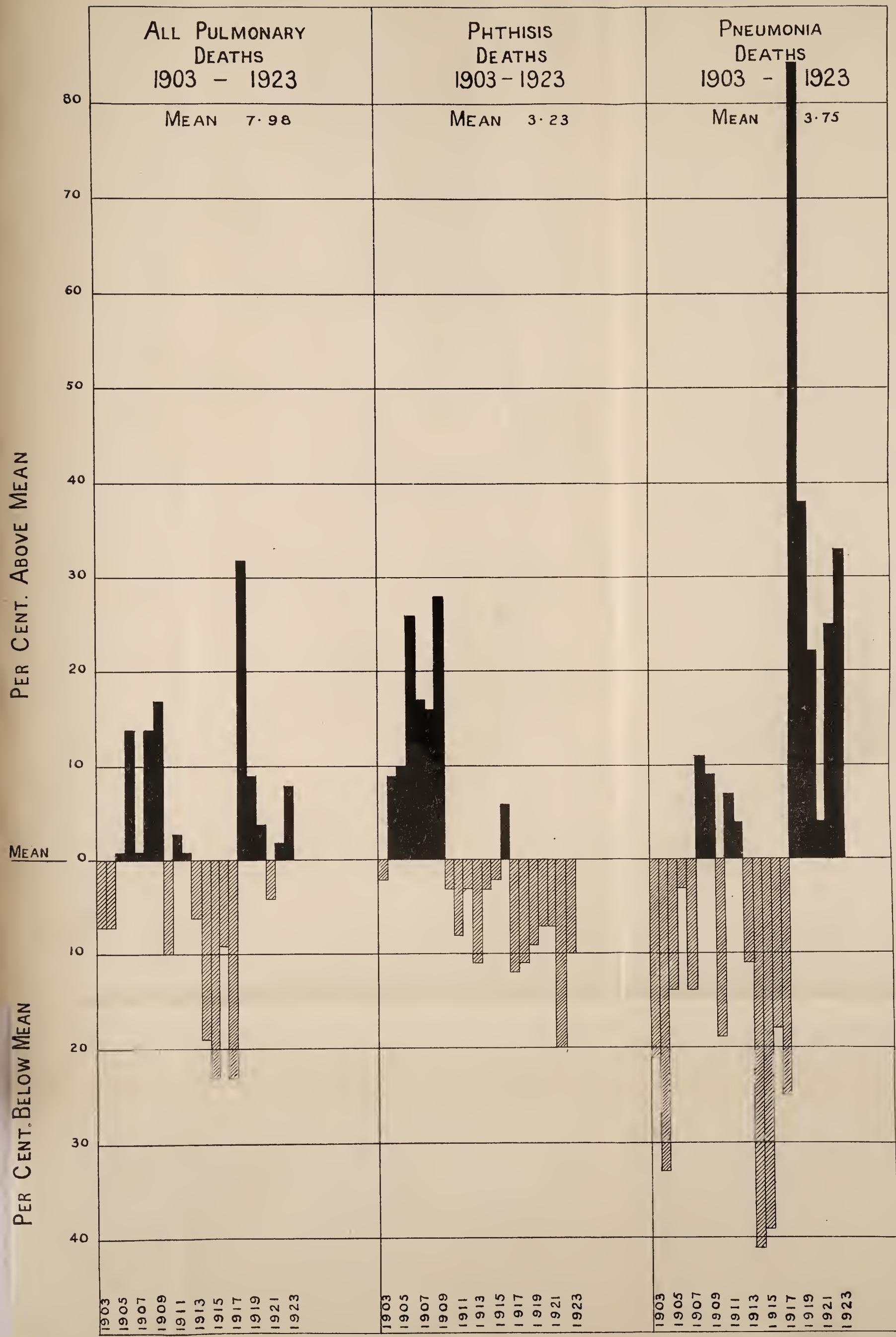


CHART A

BUHLIGER
DETAILED
1981-1983

ES-6000M

AT PULMONARY
DETAILED
1981 - 1983

ES-6000M

(31) *Death-rates from Phthisis amongst the Indigenous Races, 1918 to 1923.*

	Males.						Females.					
	1918.	1919.	1920.	1921.	1922.	1923.	1918.	1919.	1920.	1921.	1922.	1923.
Burghers	... 1.95	... 2.70	... 0.90	... 2.35	... 2.49	... 2.01	... 2.64	... 2.49	... 2.34	... 1.31	... 2.09	... 1.83
Sinhalese	... 3.37	... 4.13	... 4.43	... 3.35	... 2.61	... 2.93	... 5.97	... 4.21	... 4.58	... 4.08	... 3.53	... 3.74
Moors	... 2.03	... 1.57	... 1.82	... 1.80	... 1.64	... 1.68	... 3.65	... 3.00	... 3.00	... 4.02	... 3.41	... 5.45
Malays	... 1.76	... 2.11	... 1.77	... 2.54	... 2.90	... 4.20	... 5.14	... 2.77	... 5.93	... 6.55	... 5.44	... 5.09
All Races	... 2.71	... 3.14	... 3.03	... 2.53	... 2.00	... 2.37	... 3.93	... 3.65	... 4.09	... 3.79	... 3.60	... 3.94

XXXIII.—INFLUENZA.

317 deaths were registered as against 247 deaths in 1922.

Judging from the number of cases treated at the Municipal Dispensaries, the disease was prevalent throughout the year, with a rather marked increase in the months of May and December. Influenza is highly infectious in the early stages, and as most people regard it at first as a common cold and go about their daily routine even during the febrile stage, the infection becomes wide spread, especially as one attack of the disease seems to predispose to subsequent attacks. The control of the disease rests mainly with the public; if the first case in every household is properly isolated and the patient stays in bed without going about broadcasting the germs, the disease would not become so widely prevalent. Neglect or exposure to cold and wet during the febrile stage, or before the catarrhal symptoms have completely disappeared, is generally dangerous, and when pneumonia supervenes the disease usually ends fatally. Influenza was undoubtedly responsible for the increased mortality from pneumonia.

XXXIV.—DIARRHŒAL DISEASES.

Under this heading are included diarrhoea, enteritis, and dysentery, none of which are notifiable.

The total deaths from all these causes were 990, representing a death-rate of 3.95 per thousand as against 722 deaths, and a death-rate of 2.92 per thousand in the previous year.

(a) *Diarrhoea and Enteritis*.—Deaths 681; death-rate 2.72 per thousand, as against 2.18 per thousand in 1922. The highest rate occurred amongst the Malays.

(b) *Dysentery*.—Deaths 309; death-rate 1.23 per thousand, as against 0.74 per thousand in the previous year. The highest rate as usual was amongst the Tamils.

These diseases are associated with flies, overcrowding, lack of cleanliness, and other unhygienic conditions, all of which are usually present in the slum areas, and which were aggravated by the weather conditions of last year. Owing to the epidemic of rinderpest, dung could not be regularly removed from dairies and cattle sheds, and consequently flies, which play such an important part in the spread of enteric, dysentery, &c., by contaminating food, were exceptionally prevalent throughout the year. In addition the refuse destructor was out of commission for some time, and all refuse was dumped within the town in the swampy land near the destructor, and this undoubtedly provided an excellent breeding place for flies. Also, the exceptionally wet weather led to increased overcrowding, accumulation of organic refuse, pollution of soil, neglect of private premises and bucket latrines—conditions favourable to the generation and spread of these diseases.

(32) *Diarrhoeal Diseases, 1923, by Race. Rate per 1,000 Population.*

	All Races.	Euro- peans.	Bur- ghers.	Sin- halese.	Tamils.	Moors.	Malays.	Others.
Diarrhoea and enteritis	... Deaths	... 681	... 2	... 34	... 385	... 114	... 103	... 21
	... Death-rate	2.72	0.69	2.23	3.28	2.05	2.53	3.50
Dysentery	... Deaths	... 309	... 2	... 8	... 160	... 79	... 40	... 6
	... Death-rate	1.23	0.69	0.52	1.36	1.42	0.98	1.00
All diarrhoeal	... Deaths	... 990	... 4	... 42	... 545	... 193	... 143	... 27
	... Death-rate	3.95	1.38	2.75	4.64	3.47	3.51	4.50

XXXV.—FEVERS.

Under this heading are included enteric fever, continued fever of over seven days' duration, and remittent and intermittent fevers, of which only the first two are notifiable.

(33) *Fever, 1923, by Race. Cases, Deaths, and Rates per 1,000 Population.*

	All Races.	Euro- peans.	Bur- ghers.	Sin- halese.	Tamils.	Moors.	Malays.	Others.
Enteric fever	... Cases	... 741	... 19	... 55	... 504	... 80	... 33	... 11
	... Case-rate	2.96	6.53	3.61	4.29	1.44	0.81	1.83
	... Deaths	... 269	... 3	... 17	... 185	... 31	... 12	... 3
	... Death-rate	1.07	1.03	1.11	1.57	0.56	0.30	0.50
Continued fever	... Cases	... 110	—	... 5	... 75	... 17	... 8	... 4
	... Case-rate	0.44	—	0.33	0.64	0.31	0.20	0.66
	... Deaths	... 37	—	—	23	8	3	2
	... Death-rate	0.15	—	0.07	0.20	0.14	0.07	0.33
Remittent fever	... Deaths	... 164	—	... 7	... 88	... 38	... 19	... 6
	... Death-rate	0.65	—	0.46	0.75	0.68	0.47	1.00
Intermittent fever	... Deaths	... 2	—	—	—	1	—	—
	... Death-rate	0.01	—	0.07	—	0.02	—	—
All fevers	... Cases	... 851	... 19	... 60	... 579	... 97	... 41	... 15
	... Case-rate	3.40	6.53	3.94	4.93	1.75	1.01	2.49
	... Deaths	... 472	... 3	... 26	... 296	... 78	... 34	... 11
	... Death-rate	1.88	1.03	1.71	2.52	1.40	0.84	1.83

(34) *Fevers by Wards, 1923. Cases, and Case-rate per 1,000 Population.*

		Colombo.	Fort and Galle Face.	Pettah.	San Sebastian.	St. Paul's.	Kotahena.	New Bazaar.	Maradana.	Slave Island.	Kollupitiya	Wellawatta.	Port.	Outside.	Untraced.
Enteric fever ...	Cases ...	741	2	2	11	24	123	40	132	56	21	30	14	192	94
	Case-rate ...	2.96	0.72	0.26	0.93	1.00	2.59	1.67	2.23	2.53	0.86	1.10	—	—	—
Continued fever	Cases ...	110	—	1	2	7	33	8	28	4	3	10	—	5	9
	Case-rate ...	0.44	—	0.13	0.17	0.29	0.70	0.33	0.47	0.18	0.12	0.37	—	—	—
All fevers ...	Cases ...	851	2	3	13	31	156	48	160	60	24	40	14	197	103
	Case-rate ...	3.40	0.72	0.39	1.10	1.29	3.29	2.00	2.70	2.71	0.98	1.47	—	—	—

Enteric Fever.—741 cases; 269 deaths; case mortality 36.2 per cent.; case-rate 2.96 per thousand; death-rate 1.07 per thousand of population. Of the 741 cases, 535 were town cases, 14 port cases, and 192 outside cases. In the previous year the number of town cases was 341.

As usual, the crowded insanitary areas of Kotahena and Maradana Wards were chiefly affected. As stated in the section dealing with diarrhoeal diseases, flies were exceptionally bad last year, and the general sanitary condition of private premises and bucket latrines was, on the whole, unsatisfactory, and these conditions were undoubtedly responsible for the increased number of cases. Cases are notified often so late as to make preventive measures practically useless. See explanation for this under section dealing with continued fever.

(35) *Enteric Cases reported during the Year 1923 (inclusive of Port and Outside Cases). Distribution by Race, Age, and Sex.*

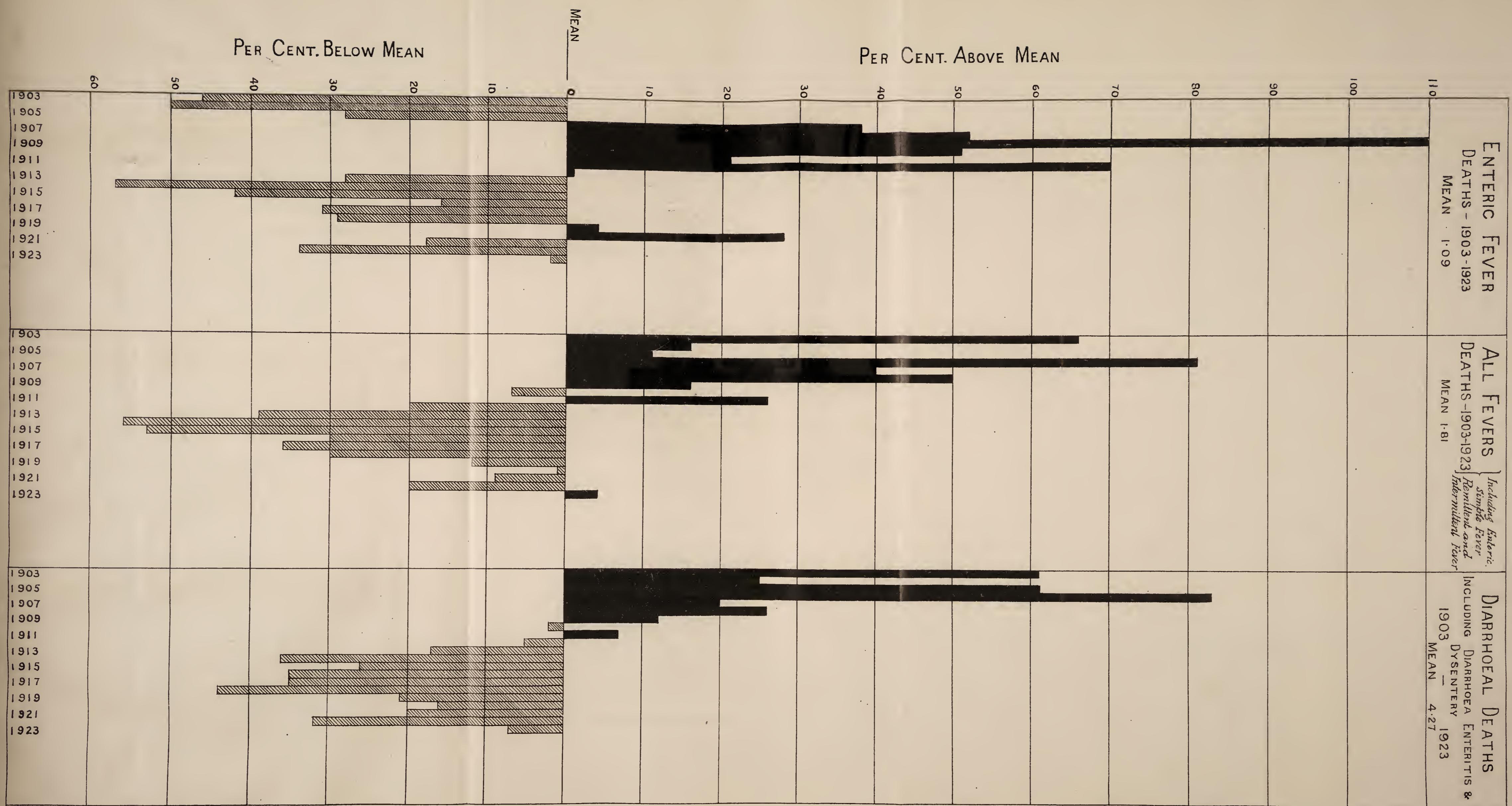
Race.	Sex.	0 to 5 years.	5 years to 10 years.	10 years to 15 years.	15 years to 20 years.	20 years to 25 years.	25 years to 30 years.	30 years to 35 years.	35 years to 40 years.	40 years to 50 years.	50 years to 60 years.	60 years and over.	All Ages.	Total of each Race.	Case Rate per 1,000 Population.	Deaths.	Case Mortality Per Cent.	Mortality per 1,000 Population.
All Races...	Males	17	41	64	81	60	68	29	30	25	12	4	431	741	2.96	269	36.2	1.07
	Females	20	36	43	40	59	30	29	17	24	10	2	310	—	—	—	—	—
Europeans.	Males	1	—	1	1	1	2	3	1	2	—	—	11	19	6.53	3	15.8	1.03
	Females	—	—	—	—	—	—	—	—	—	—	—	8	—	—	—	—	—
Burghers...	Males	1	5	7	4	1	2	1	2	5	1	30	30	55	3.61	17	31.0	1.11
	Females	1	7	3	1	4	3	1	—	2	3	—	25	—	—	—	—	—
Sinhalese...	Males	14	29	46	57	34	42	15	12	13	7	2	271	504	4.29	185	36.7	1.57
	Females	12	23	35	32	46	22	22	14	20	6	1	233	—	—	—	—	—
Tamils ...	Males	—	2	5	11	8	7	5	7	3	4	1	53	80	1.44	31	38.7	.56
	Females	6	3	1	5	5	3	2	1	—	1	—	27	—	—	—	—	—
Moors ...	Males	—	3	4	4	3	3	2	2	1	—	—	22	33	.81	12	36.4	.30
	Females	1	3	1	1	2	—	1	—	—	1	—	11	—	—	—	—	—
Malays ...	Males	—	2	1	1	1	—	—	—	—	—	—	6	11	1.83	3	27.3	.50
	Females	—	—	—	—	—	—	—	—	—	—	—	5	—	—	—	—	—
Others ...	Males	1	—	1	4	13	9	6	3	1	—	—	38	39	3.12	18	46.1	1.44
	Females	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—

Continued Fever.—Total cases 110; case-rate 0.44 per thousand; deaths 37; death-rate 0.15 per thousand.

The majority, if not all, of the fatal cases were probably cases of enteric fever which had been seen, perhaps only a few days before death by the medical practitioner reporting the case. All the fevers which are not definitely diagnosed are usually reported under the convenient term of continued fever, and the real nature of the disease remains unknown. The medical practitioner cannot be blamed, because what usually happens is this: when a person falls ill, the most usual thing is to try "home remedies" on him for about a week; when these fail, as they usually do if the disease is enteric, recourse is had to "vernacular" treatment for about another week. Under this treatment the patient either dies or gets worse. If he dies the vederala treating him reports the case as "fever," and it goes to swell the number of undiagnosed fevers. In the second event, a medical practitioner is very reluctantly called in, but the full and true history of the illness is, as a rule, very carefully hidden from him; the usual tendency is to make out that the illness was of short duration. If the patient lives long enough, well and good, and the medical practitioner is able to make a correct diagnosis from the clinical symptoms, or by bacteriological examination, but if the patient dies in a couple of days after coming under his care, before he has diagnosed the case, he has no alternative but to report it as one of continued fever.

If the case is really enteric it will be seen what a great deal of mischief must have been done in the way of spreading infection before it came to the notice of this department. It is quite a common occurrence for our officers to find, on arriving at the house, the patient either dead, dying, or convalescent, and no precautionary measures adopted against the spread of infection to other members of the family, or to those living in the same garden in the case of tenements. When one remembers that the stools of the patient are emptied into the bucket latrine common to a number of tenements, there is no room for surprise that enteric fever is so

CHART VI



PER CENT DE FROM MEAN

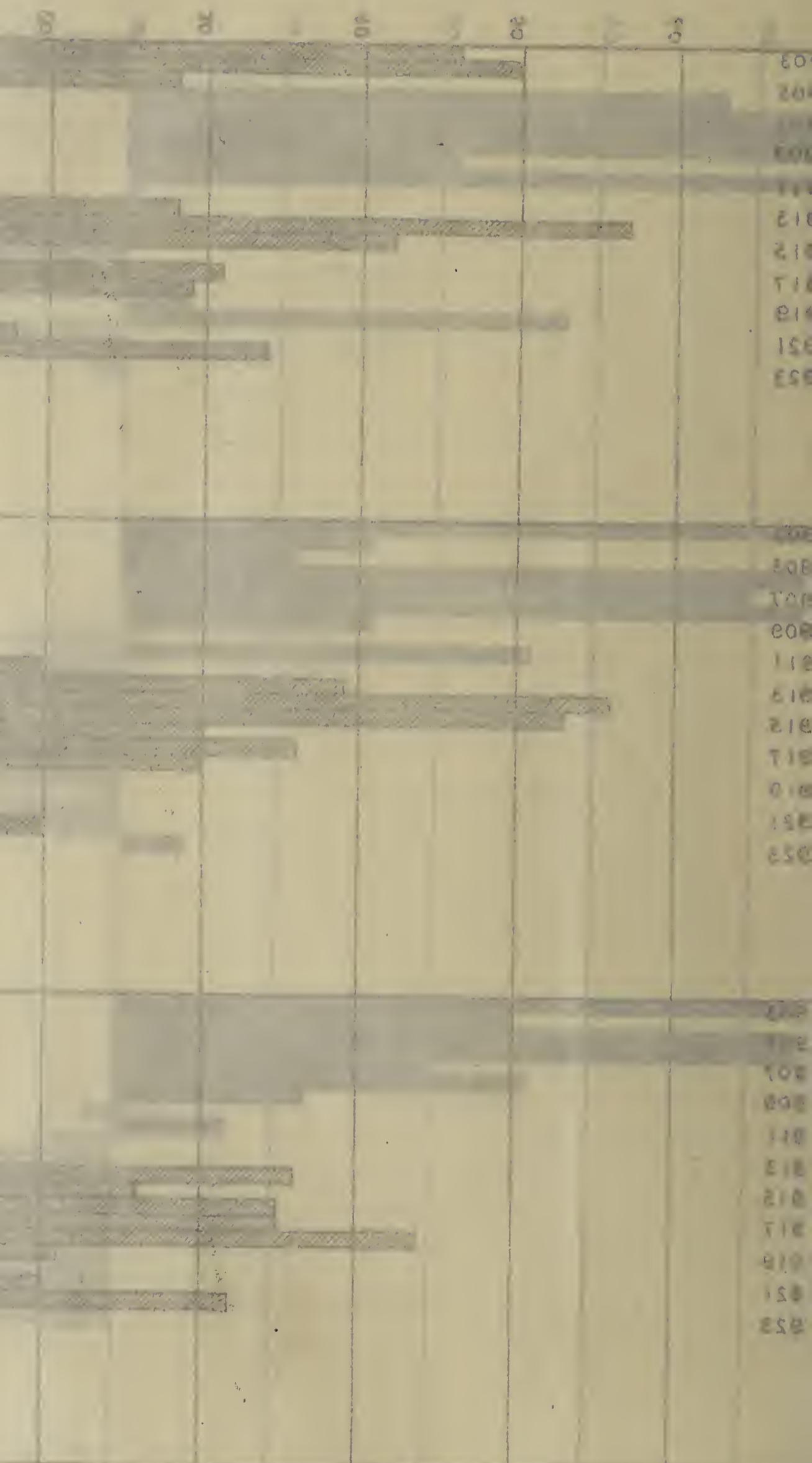


CHART. VII

ENTERIC FEVER CASES 1923

SHADED 1923

PLAIN AVERAGE 1914 - 1923

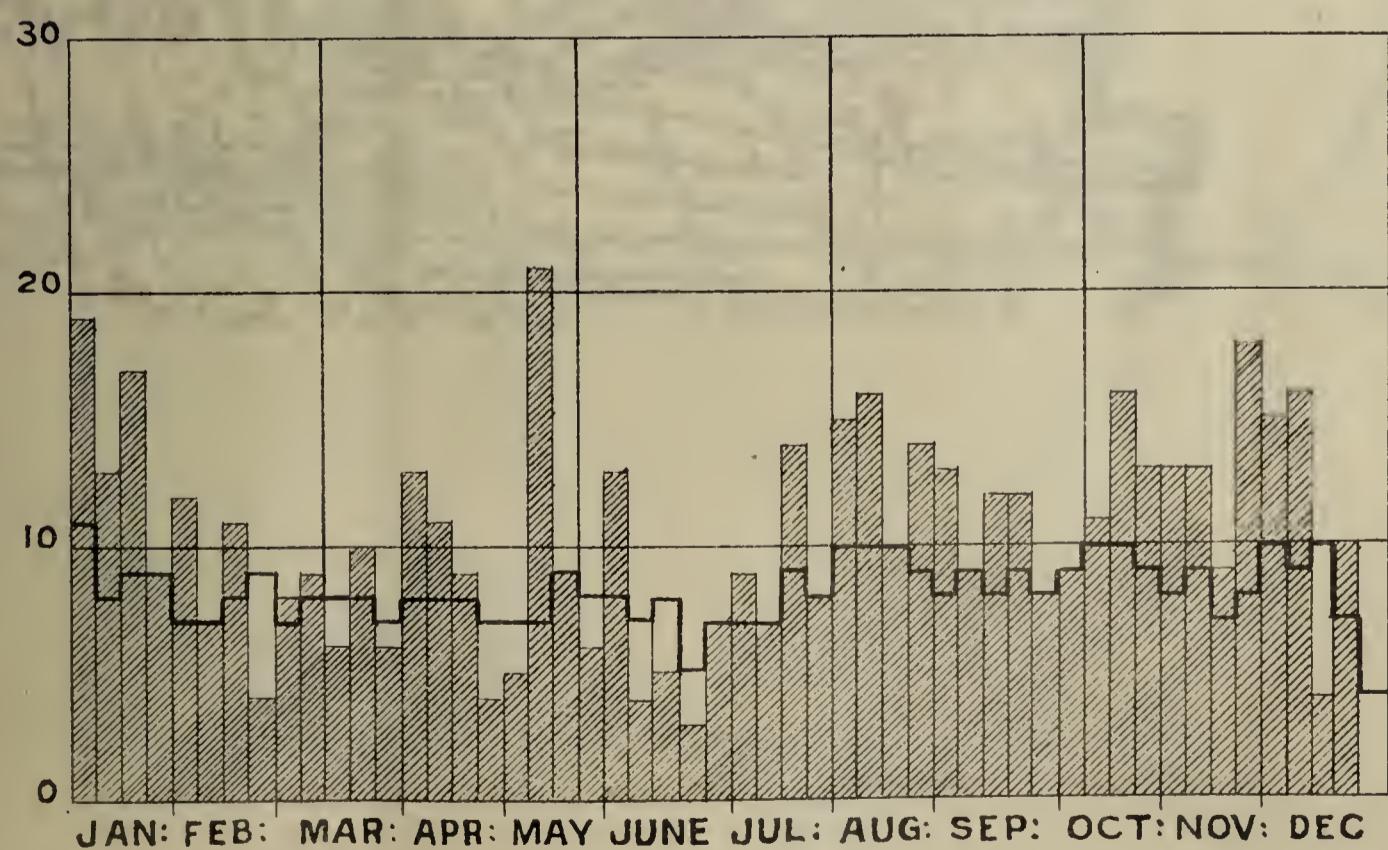
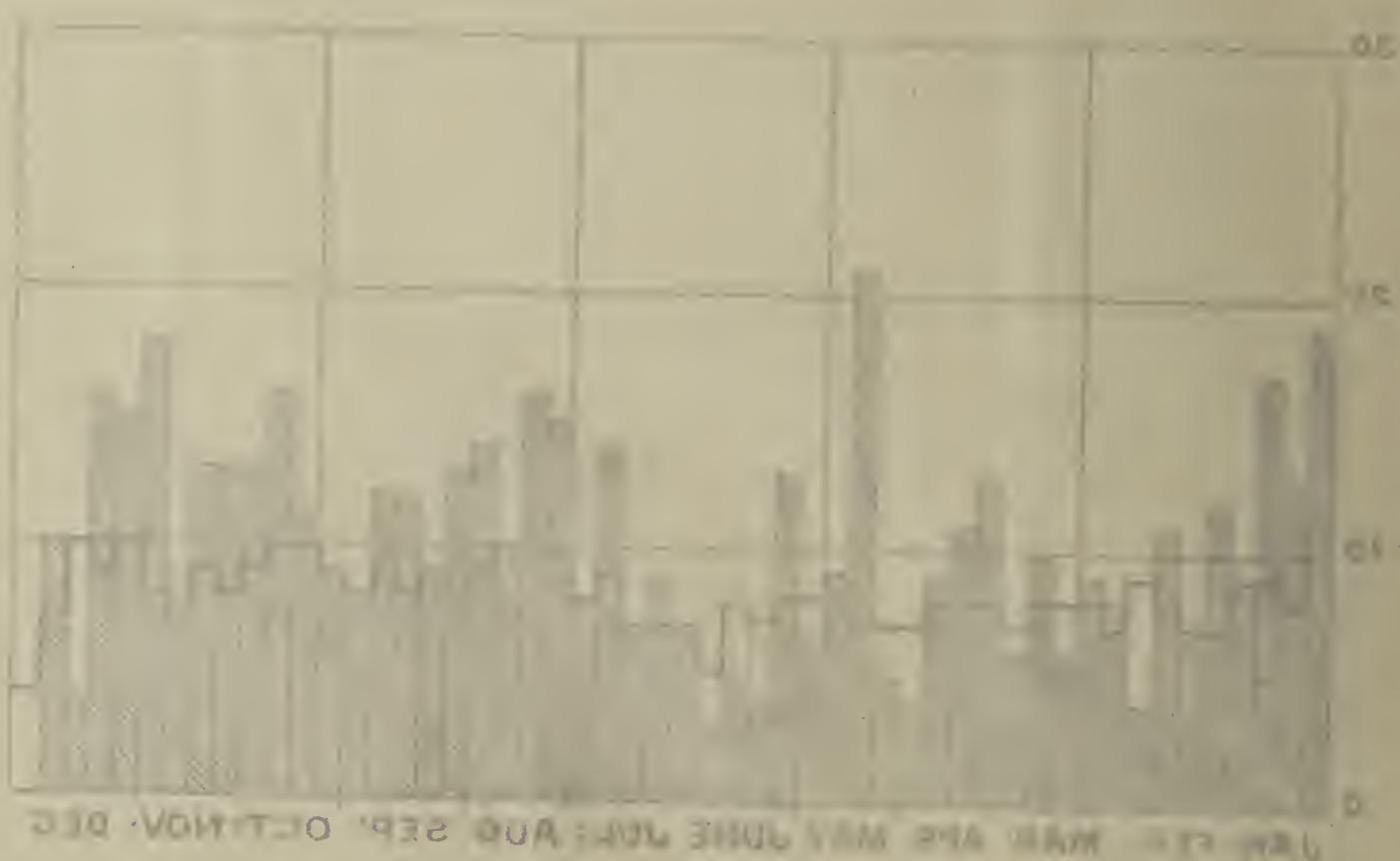


CHART AII

ENTERIC FEVER CASES 1953

SHANZO (353)

PRIN AVENAGE (194-1953)

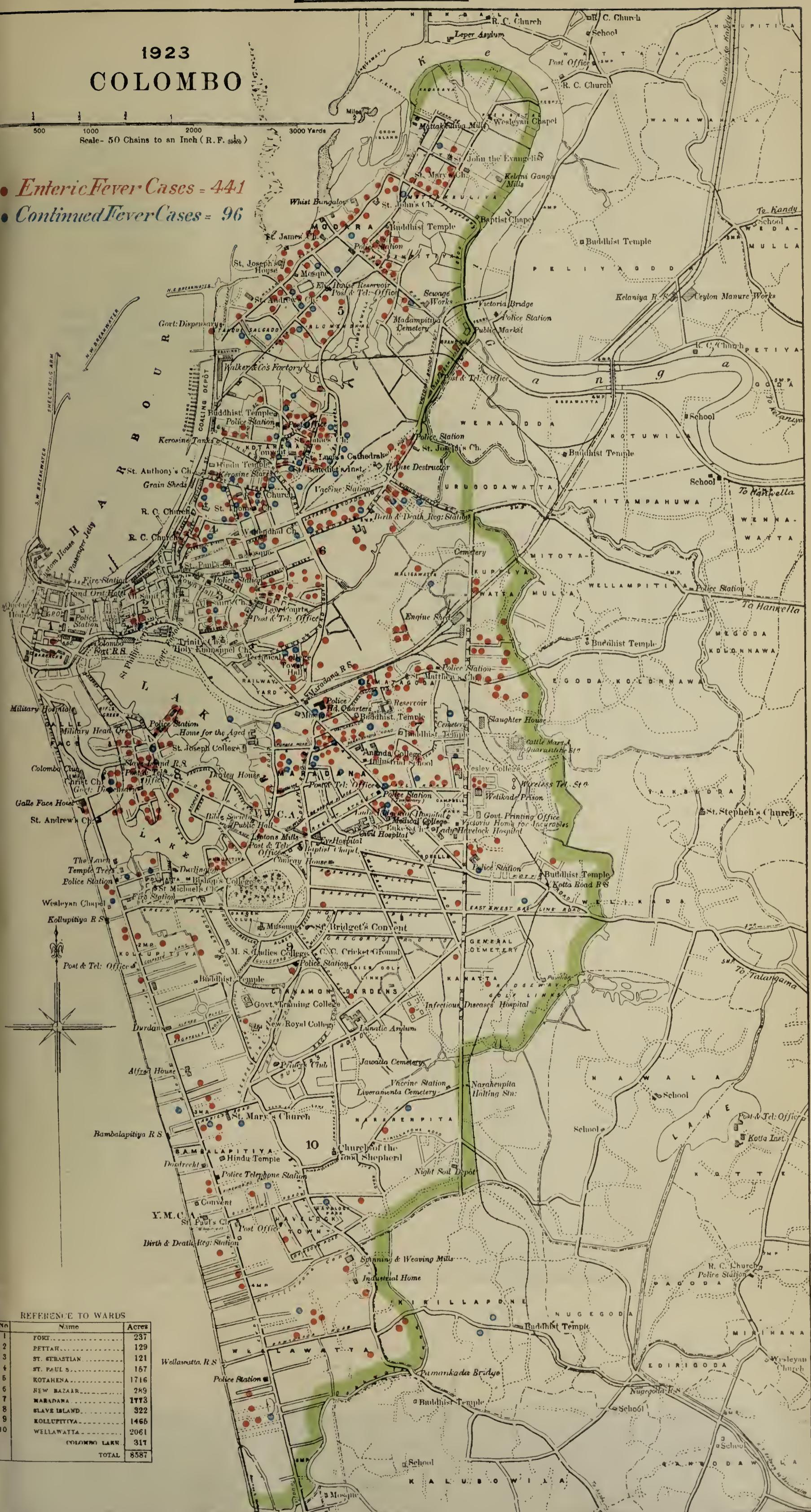


SPOT MAP B.

1923
COLOMBO

Scale- 50 Chains to an Inch (R.F. $\frac{1}{5000}$)

- *Enteric Fever Cases* = 441
- *Continued Fever Cases* = 96



REFERENCE TO WARDS

No	Name	Acres
1	FORT	237
2	PETTAH	129
3	ST. SEBASTIAN	121
4	ST. PAUL S.	167
5	KOTAHENA	1716
6	NEW BAZAIR	289
7	MARADANA	1773
8	SLAVE ISLAND	822
9	KOLLUPITIYA	1466
10	WELLAWATTA	2061
	COLOMBO LAKE	317
	TOTAL	8587

prevalent in Colombo. As a rule, our officers get on the scene too late, and precautionary measures are adopted after a great deal of mischief has already been done.

Malaria.—Deaths 166; death-rate 0.66 per thousand, as against 127 deaths and a death-rate of 0.51 per thousand during the previous year.

Malaria was unusually prevalent throughout the Island last year, as the following information kindly supplied by the Principal Civil Medical Officer shows. The number of cases treated at the Colombo General Hospital was more than double the number of cases treated during the preceding year.

(36) *Malaria in Ceylon.*

	1920.	1921.	1922.	1923.
Cases treated in the whole Island ...	16,538	27,447	28,925	1,227,747
Cases treated in the Western Province				
exclusive of the General Hospital. 2,807 ...	4,036	6,754	189,552	
Cases treated at the General Hospital... 767 ...	1,119	2,151	4,679	

Early last year, in a house in Alston place, 6 cases of locally-acquired malaria, microscopically confirmed, were brought to the notice of this department, and on investigation, two chronic malarial subjects were found living in the adjoining house. On search being made for mosquito breeding places, *Anopheles sinensis* was found breeding in a pit in the adjoining premises, and in a pool in the reclaimed part of the Hunupitiya end of the lake. An adult *Anopheles listoni* was caught in the patient's bungalow, but its breeding place, though carefully searched for, was not discovered.

Another case of locally-acquired malaria was reported from Horton place, and on investigation, *Anopheles sinensis* was found breeding in the swampy land at the junction of Horton place and McCarthy road. All these breeding places were abolished, and no further cases were reported from the Cinnamon Gardens district.

2,411 cases of malaria were treated at the four Municipal Dispensaries during the year. In the case of 1,932 of these, there was a definite history of infection acquired outside Colombo. As regards the rest, 432 cases were not traced, as false addresses had been given at the dispensaries, and in 43, the infection was believed to have been acquired in Colombo. These cases were not microscopically confirmed, and it is possible that all were not malaria and all were not infected in Colombo, as several of these cases, particularly the Modera and Rajamalwatta ones, had been on pilgrimage to shrines in malarial districts, and had probably acquired infection there. In the case of some the evidence seems to be in favour of local infection. The majority of these cases occurred moreover in the neighbourhood of swampy grassfields where mosquitoes are always bad, and where *Anopheles rosii* was found in large numbers, but the part this species plays in transmitting malaria has not been fully worked out. In the districts in which these cases of malaria occurred, numbers of people harbouring the malaria parasite live. They are, for the most part, workmen who have returned to Colombo ill with malaria acquired in the various new railway extensions in the Island.

These carriers are important factors in spreading the infection, and are a distinct danger to the town, because they increase the foci of infection within the town. Known malaria carriers such as *A. culicifacies*, *A. listoni*, and *A. sinensis* have been found breeding within the town. We do not yet know definitely whether *A. rosii*, which is found in such large numbers in the town, is an effectual agent in the transmission of the disease, but if it proves to be so, Colombo, with its extensive swamps within, and around it, and with no anti-mosquito legislation, will be faced with a very serious problem.

(37) *Malaria Cases Reported from Municipal Dispensaries.*

Town cases (traced)	...	...	43
Town cases (untraced)	...	...	436
Outside	...	...	1,932
		Total ...	<u>2,411</u>

(38) *Malaria in Colombo.*

Addresses of cases said to have acquired the disease in Colombo.

Reported from Municipal Dispensaries.

48	Kochikadde.	27	Maligawatta	<i>A. rosii</i> found in the neighbour- hood.
3	Brassfounder street.	89	Maligawatta	
2	Green street.	29	Ketawalamulla road	
12	New Chetty street.	105	Ketawalamulla road	
70	Wolfendahl street.	45	Panchikawatta	
35	Modera street.	8/63	Maligakanda road	
32	Modera street.	22/8	Maligakanda road	
2	Modera street.	22/8	Maligakanda road	
253	Modera street.	4	Albion road	
313	Modera street.	4	Albion road	
6	Modera street.	43	Paranawadia road	
34	Modera street.		Cattle Mart	
297	Rajamalwatta.	32	Forbes road	
21	Belmont street	41	Forbes road	
1A/34	Prince's gate	7	Forbes road	
36	Grandpass road	7	Forbes road	
645	Silversmith street	16	Stafford place	
133/29	Layard's broadway	4	Chapel lane.	
197	Dematagoda	5/5	Chapel lane.	
197c3	Dematagoda	20/9	Short's road.	
33	Dematagoda		Maligakanda temple	
263	Dematagoda		(Vagrant).	

Malaria, 1923.

Reported from Municipal Dispensaries.

Cases reported to have acquired the Infection outside Colombo.

(39) *Chief Sources of Imported Malaria in 1923.*

Kurunegala	...	...	224	Brought forward	...	945
Anuradhapura	...	...	160	Matara	...	38
Chilaw	...	...	73	Veyangoda	...	36
Ragama	...	...	71	Galle	...	30
Puttalam	...	...	66	Henaratgoda	...	30
Maho	...	...	60	India	...	30
Ratnapura	...	...	59	Kattaragama	...	28
Polgahawela	...	...	55	Rambukkana	...	27
Negombo	...	...	52	Mirigama	...	26
Madhu	...	...	45	Jaffna	...	26
Trincomalee	...	...	41	Kelaniya	...	22
Kandy	...	...	39	Avissawella	...	21
				All other sources	...	673
	Carried forward ...		945		Total ...	1,932

XXXVI.—PLAQUE.

Human Plague.—There were 230 cases with 209 deaths, as against 136 cases and 131 deaths in the previous year. The case mortality rates were 90·9 per cent. for all cases as against the average of 93·8; 100 per cent. for septicæmic cases which is the same as the average, and 87·2 per cent. for bubonic as against the average of 87·1 per cent.

The marked increase above the average which began in December, 1922, was maintained till the end of February, when there was a marked drop in the weekly incidence during the first three weeks of March, and again the number of cases went up, and kept above the average, practically right through the off-season with a well-marked increase in August and September. An unusual feature was the comparatively large number of rat and human plague cases during the off-season.

Last year's abnormal rainfall, associated with a low atmospheric temperature and high humidity, was undoubtedly responsible for the large number of cases of plague during the normal off-season. It is especially noteworthy that the proportion of *X. cheopis*—the special plague carrying flea found on rats, never fell below 9·49 per cent. Dr. Hirst is of opinion that the number of *X. cheopis* was abnormal throughout the off-season of plague, and the increase more pronounced than usual in November and December. He attributes this increase to the abnormal weather conditions which were favourable for the multiplication and survival of *X. cheopis*.

Of the 230 cases of plague, 66 were septicæmic and 164 were bubonic. As statement 40 shows, since 1920 the proportion of bubonic cases to septicæmic cases has been gradually increasing, and last year it was the highest. From 1914—the year of outbreak of plague in Colombo—to 1919, the proportion of septicæmic cases of plague was higher. Dr. Hirst thinks this is due to a gradual lowering of the virulence of the Colombo strain.

The largest number of cases occurred in the month of February, when there were 32 cases, as against 10 in the previous year.

St. Paul's and Pettah Wards were again the chief centres of infection. There were localized outbreaks in Slave Island, and in First and Second Division Maradana, due to infection carried in poonac, grain, &c., from the endemic centres. A few sporadic cases occurred in other parts of the town and these were also undoubtedly due to carriage of infected fleas from the grain stores in the endemic centres.

As usual males between the ages of 15 and 25 were chiefly attacked.

(40) *Plague, 1914–1923.*

	1914.	1915.	1916.	1917.	1918.	1919.	1920.	1921.	1922.	Average, 1914–1922.	1923.
Total ...	413	139	291	207	70	87	235	184	136	195	230
Total deaths ...	381	128	273	196	69	82	223	170	131	183	209
Septicæmic cases ...	247*	81*	159	124	41	50	93	70	57	102	66
Septicæmic deaths ...	246	80	159	124	41	50	93	70	57	102	66
Bubonic cases ...	166	58	132	83	29	37	142	114	79	93	164
Bubonic deaths ...	135	48	114	72	28	32	130	100	74	81	143
Total case mortality per cent.	92·2	92·8	93·8	94·7	98·6	94·3	94·9	92·4	96·3	93·8	90·9
Septicæmic case mortality per cent. ...	99·6	98·7	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0
Bubonic case mortality per cent. ...	81·3	82·7	86·4	86·7	96·6	86·5	91·5	87·7	93·8	87·1	87·2
Septicæmic cases per cent. ...	59·8	58·0	54·6	59·9	58·5	57·5	39·6	38·1	41·9	52·3	28·7
Bubonic cases per cent. ...	40·2	42·0	45·4	40·1	41·5	42·5	60·4	61·9	58·4	47·7	71·3

* The cases for 1914 and 1915 each includes one Septicæmic recovery, but the diagnosis was not in either case confirmed bacteriologically, and may have been erroneous.

SPOT MAP. C.

PLAQUE IN COLOMBO 1923

- Human Cases
- Rat Cases



REFERENCE TO WARDS

No.	Name	Acres
1	FORT	237
2	PETTAH	129
3	ST. SEBASTIAN	121
4	ST. PAUL S.	167
5	KOTAHENA	1716
6	NEW BAZAAR	289
7	MABADANA	1773
8	SLAVE ISLAND	822
9	KOLLUPITIYA	1465
10	WELLAWATTA	2061
	COLOMBO LAKE	317
	TOTAL	8537

CHART, MUL

PER PAGE CASES
SHADES 1953
PER PAGE AVERAGE

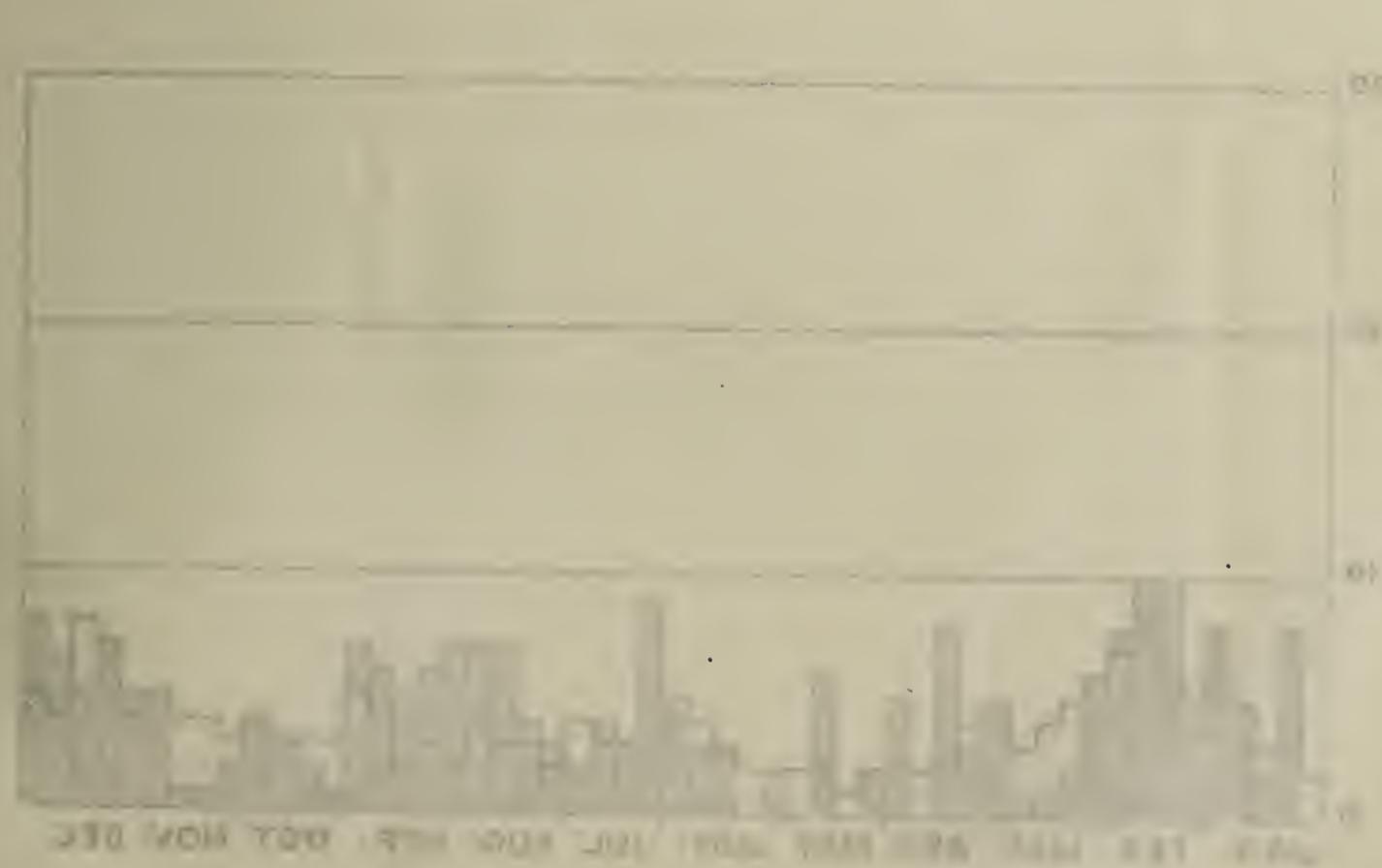


CHART. VIII

PLAQUE CASES SHADED 1923 PLAIN AVERAGE 1914 - 1923

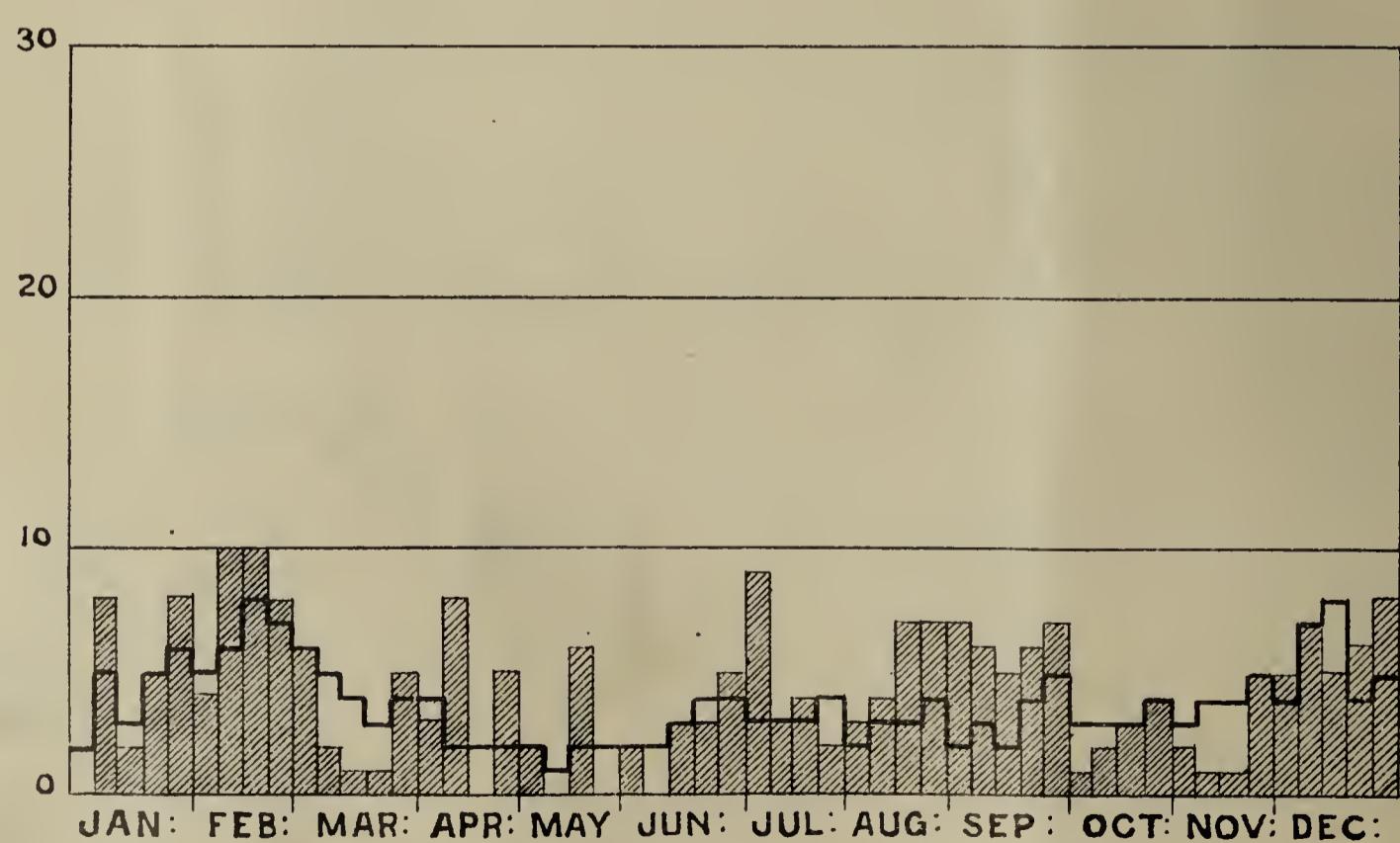


CHART IX

PRAGUE, 1953

84 MONTHS

CAUSES IN ENDEMIC TYPHOEIC DISEASES OF THE YEAR

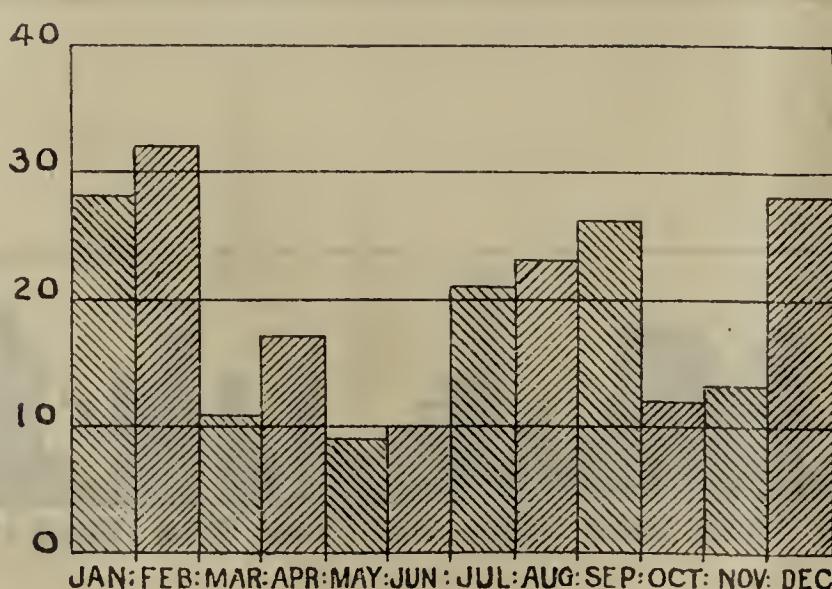
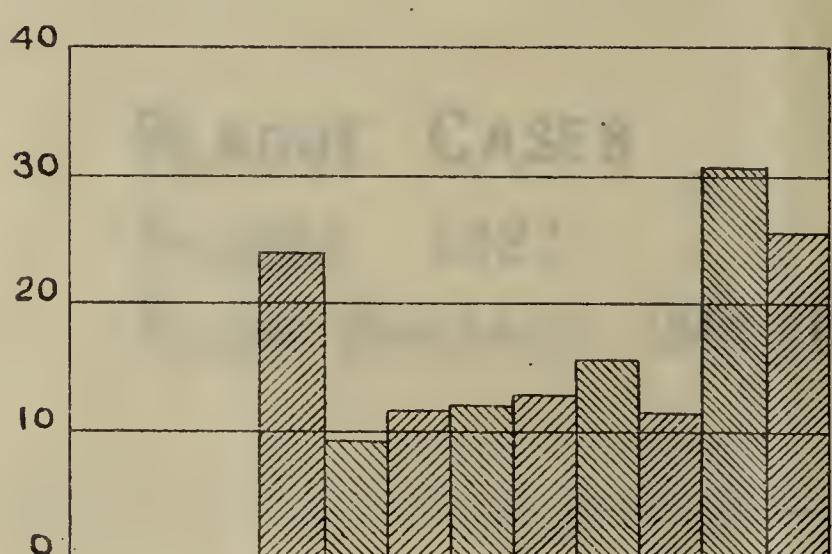
CHART. IX

PLAQUE. 1923

BY MONTHS

PERCENTAGE OF X CHEOPIS OF RAT FLEAS
CAUGHT IN ENDEMIC PLAGUE AREA.

HUMAN CASES.



(41) *Plague—Distribution by Wards.*

Ward.	Cases.	Deaths.	Ward.	Cases.	Deaths.
Fort	1	1	Brought forward	160	145
Pettah	41	38	Slave Island	37	35
San Sebastian	9	8	Kollupitiya	5	4
St. Paul's	48	44	Cinnamon Gardens	3	3
Kotahena	10	9	Bambalapitiya	5	5
Mutwal	2	2	Timbirigasyaya	—	—
New Bazaar	15	12	Wellawatta	—	—
Maradana North	10	8	Untraced	20	17
Maradana South	16	15			
Dematagoda	8	8			
Carried forward	160	145	Total	230	209

(42) *Monthly Incidence of Plague Cases.*

		1914.	1915.	1916.	1917.	1918.	1919.	1920.	1921.	1922.	Average, 1914-1922.	1923.
January	4	19	17	25	13	—	25	65	13	20
February	67	6	18	40	18	1	20	53	10	26
March	58	3	18	61	10	3	3	27	6	21
April	28	3	14	34	11	—	3	7	2	11
May	29	3	11	11	2	—	4	2	7	8
June	49	1	36	3	9	—	3	1	8	12
July	47	5	43	6	2	—	12	3	10	14
August	40	20	35	1	1	2	7	2	7	13
September	18	21	25	3	—	5	18	2	7	11
October	23	24	24	7	—	18	28	9	14	16
November	24	10	25	10	2	34	34	4	19	18
December	26	24	25	6	2	24	78	9	33	25
Total for the year	413	139	291	207	70	87	235	184	136	195
Monthly mean	34.4	11.6	24.2	17.2	5.8	7.2	19.6	15.3	11.3	16.2
												19.2

(43) *Plague Cases, 1923—Distribution by Race, Age, and Sex.*

Race.	Sex.	Age Groups										Total of each Race.	Case rate per 1,000 Population.	Deaths.	Case Mortality per Cent.	Mortality per 1,000 Population.	
		0 to 5 Years.	5 to 10 Years.	10 to 15 Years.	15 to 20 Years.	20 to 25 Years.	25 to 30 Years.	30 to 35 Years.	35 to 40 Years.	40 to 50 Years.	50 to 60 Years.						
All Races	Males	1	3	24	54	43	20	22	12	14	2	2	197	230	.92	209	90.9
	Females	1	2	7	7	4	1	3	4	2	1	1	33				
Europeans	Males	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Females	—	—	—	—	—	—	—	—	—	—	—	—				
Burghers	Males	—	—	1	—	1	—	—	—	—	1	3	—	4	.26	4	100.0
	Females	—	—	—	—	—	—	—	—	—	1	1	—				
Sinhalese	Males	—	2	4	12	6	1	6	—	1	—	1	33	48	.41	43	89.5
	Females	—	4	4	1	—	2	3	—	1	—	1	15				
Tamil	Males	—	10	17	18	8	11	10	5	1	—	80	90	1.62	81	90.0	
	Females	—	1	3	2	2	1	—	1	—	1	10					
Moors	Males	1	1	9	20	11	7	3	1	4	1	—	58	65	1.60	61	93.7
	Females	1	1	—	1	1	—	1	—	2	—	7	—				
Malays	Males	—	—	2	—	—	—	—	—	—	—	2	—	2	.33	2	100.0
	Females	—	—	—	—	—	—	—	—	—	—	—	—				
Others	Males	—	—	3	7	4	2	1	4	—	—	21	—	21	1.68	18	85.7
	Females	—	—	—	—	—	—	—	—	—	—	—	—				

Rat Plague.—29,312 rats were examined at the Municipal Bacteriological Laboratory, and 153, or 0.52 per cent., were found to be infected, as against 57 rats, and an infection rate of 0.17 in the previous year. The vast majority of rats, which become infected, die in their underground runs, and the number of infected rats known, represents only a microscopic minority of the number which die. There was an outbreak of rat plague at the Customs in the month of May, when 29 dead rats were found in a block of warehouses; 27 of these rats were found on bacteriological examination to be plague infected; the other two were mummified and unfit for bacteriological examination, but had undoubtedly died of plague. Twenty-one live rats were killed, but they gave a negative result for plague.

One cat and one squirrel were found plague infected during the year. The cat was found dead near a plague infected house, and the squirrel was found in a house where there were several cases of rat plague.

Rat Destruction.—Altogether 137,645 rats were accounted for during the year, of which 133,684 were caught in traps, 642 were found dead (283 of these were in a mummified condition), and 3,319 were killed by the Clayton fumigators and their bodies recovered.

1,693,285 poison baits were placed, of which 80,296 were eaten or removed by rats. It is impossible to estimate the number of rats that are killed by these poison baits, or by the fumigators, as it is not possible to trace and open up all the innumerable rat-runs, without seriously damaging the building and interfering with trade, but, it is believed the number so killed is very large.

Preventive Measures.—The same preventive measures as hitherto were carried out during the year. Statement 48 shows the nature and extent of the work done by the special plague staff.

Drainage of the Endemic Area.—153 premises were connected to the sewer during the year. Work in this connection is being pushed on. Landlords who are unable to pay the cost of connection are helped with loans by the Council.

Segregation of Contacts.—Those who are able to deposit a sum of Rs. 70 as security are not sent to the Segregation Camp, but are allowed to move into another house after changing their clothes. The Ward Inspector keeps them under observation for five days. This concession is much appreciated, as it enables contacts to carry on their trade without wasting five days at the camp in enforced idleness.

(44) *Rat Destruction—All Sources, 1923.*

Number of rats trapped by Veterinary Surgeon's Department ...	133,684
Number of dead rats found by Veterinary Surgeon's Department.	81
Number of dead rats found by plague gang ...	278
Number of rats killed by clayton ...	3,319
Number of mummified rats found ...	283
Total ...	137,645

Number of poison baits placed by Veterinary Surgeon's Department	1,693,285
Number eaten or removed ...	80,296*

* It is impossible to conjecture the number of rats killed by this means.

(45) *Statement furnished by the Municipal Veterinary Surgeon showing the Number of Rats trapped and found dead during 1923.*

Month.		No. of Rats trapped.	No. of dead Rats found.	Total.
January	...	13,655	6	13,661
February	...	12,589	3	12,592
March	...	9,919	7	9,926
April	...	9,315	—	9,315
May	...	10,069	2	10,071
June	...	10,546	—	10,546
July	...	11,218	1	11,219
August	...	11,480	—	11,480
September	...	10,500	10	10,510
October	...	11,583	22	11,605
November	...	10,840	28	10,868
December	...	11,970	2	11,972
Total	...	133,684	81	133,765

(46) *Rats examined at the Laboratory, Number found infected, and percentage infection.*

Month.		No. of Rats examined.	No. Infected.	Percentage Infection.
January	...	2,999	11	0.37
February	...	2,613	5	0.19
March	...	2,392	6	0.25
April	...	1,985	19	0.96
May	...	2,427	36	1.48
June	...	2,228	4	0.18
July	...	2,573	15	0.58
August	...	2,333	7	0.30
September	...	2,311	9	0.39
October	...	2,396	16	0.67
November	...	2,943	16	0.54
December	...	2,112	9	0.43
Total	...	29,312	153	0.52

133 Specimens of musk rats "*Crocydura caerulea*" brought to the laboratory were examined. This number and 286 mummified rats received in the laboratory are not included in the above figures.

(47) *Rats trapped, killed by Claytons, and found dead during 1923.*

Month.	Rats trapped (Veterinary Surgeon.)	Rats killed by Claytons.	Mummified Rats (Plague Inspector.)	Dead Rats (Veterinary Surgeon.)	Dead Rats (Plague Inspector.)	Total.
January	13,655	401	35	6	26	14,123
February	12,589	256	26	3	26	12,900
March	9,919	294	19	7	1	10,240
April	9,315	291	22	—	12	9,640
May	10,069	363	12	2	43	10,489
June	10,546	200	14	—	5	10,765
July	11,218	403	67	1	33	11,722
August	11,480	175	16	—	22	11,693
September	10,500	214	5	10	17	10,746
October	11,583	231	7	22	20	11,863
November	10,840	298	34	28	40	11,240
December	11,970	193	26	2	33	12,224
Total	133,684	3,319	283	81	278	137,645

(48) *Work done by the Plague Staff during 1923.*

Ward.	Dwellings Claytonized.	Rat holes Claytonized.	Rats killed by Claytons.	Recently dead Rats found.	Mummified Rats found.	Rat nests found.	Dwellings Pesterined.	Dwellings Disinfected.	Cart loads of rubbish removed.
Fort	155	229	62	11	8	10	13	137	1 $\frac{3}{4}$
Pettah	760	1,835	596	70	88	50	322	513	405 $\frac{1}{2}$
San Sebastian	522	1,289	17	5	—	20	400	117	123
St. Paul's	2,316	4,490	513	66	47	80	1,714	604	419 $\frac{3}{4}$
Kotahena	532	1,340	75	3	—	20	132	173	115 $\frac{1}{2}$
Mutwal	28	46	4	1	—	4	205	8	6 $\frac{1}{2}$
New Bazaar	916	1,977	91	8	14	27	654	207	113 $\frac{1}{2}$
Maradana North	2,132	8,938	380	5	13	75	1,569	518	507
Maradana South	1,688	3,607	471	25	35	50	957	366	254 $\frac{1}{2}$
Dematagoda	471	1,153	44	2	—	18	401	70	77 $\frac{1}{2}$
Slave Island	2,475	5,400	565	33	34	55	2,189	630	530 $\frac{1}{2}$
Kollupitiya and Cinnamon Gardens	503	1,410	339	39	26	22	440	36	100 $\frac{1}{2}$
Bambalapitiya and Timbiri- gasyaya	393	1,057	91	9	10	15	120	192	99
Wellawatta	56	252	71	1	—	11	19	18	36
Total	12,947	33,023	3,319	278	283	457	9,135	3,589	2,790 $\frac{1}{2}$

XXXVII.—SMALLPOX.

There were thirty-two cases of smallpox and one death during 1923.

	No. of Cases.	No. of Deaths.
Town	3	—
Port	5	—
Outside town	24	1
Total	32	1

Two of the above cases were imported from India, and the third was a contact of one of the imported cases. Owing to the protection conferred on the population by thorough vaccination and the vigilance exercised by the staff, smallpox has little chance of assuming epidemic proportions, in the absence of concealment and of movement of patients from district to district.

Vaccination.—6,192 primary and 484 re-vaccinations were performed during the year.

The following statement shows the details of vaccination during 1923.

(49) *Vaccinations performed during 1923.*

(a) By Government Vaccinators.

Ward.	Primary Vaccination.	Re-vaccination.	Total.
Fort, Galle Face, Pettah, and			
San Sebastian	514	18	532
St. Paul's	669	19	688
Kotahena	1,012	57	1,069
New Bazaar	626	5	631
Maradana	608	207	815
Slave Island	464	55	519
Kollupitiya	1,039	22	1,061
Wellawatta	896	9	905
Itinerating (Colombo)	359	2	361
Total	6,187	394	6,581

(b) By Municipal Vaccinators.

Ward.	Primary Vaccination.	Re-vaccination.	Total.
Kotahena	2	32	34
Bambalapitiya	3	58	61
Total	5	90	95

Total Vaccinations in Colombo.

Primary	...	...	6,192
Re-vaccination	...	...	484
Total	...	6,676	

XXXVIII.—CHICKENPOX.

There were 1,315 cases, including 4 from the Port, and 76 from outside town limits. There was one death, that of an infant 15 days old, brought to the Infectious Diseases Hospital from an outstation.

The disease was most prevalent during the first five months of the year as the following statement shows:—

(50) *Monthly incidence of Chickenpox.*

January	...	...	...	156
February	...	...	...	144
March	...	...	...	175
April	...	...	...	149
May	...	...	...	132
June	...	...	...	64
July	...	...	...	38
August	...	...	...	42
September	...	...	...	62
October	...	...	...	100
November	...	...	...	98
December	...	...	...	75
Total	...	1,235		

The Malayalees of South India suffer more than any other race from this disease as the statement below shows. This is chiefly due to the domestic habits of these people; as a rule, they do not bring out their families to Ceylon, and so a number of men club together, 20 or 30 or more in one house. The close aggregation of persons naturally favours the rapid spread of the disease. Racially, also I think they are very susceptible to the disease.

(51) *Racial incidence of Chickenpox.*

Races.	No. of Cases.	Case-rate per 1,000 Population.
Europeans	1	.34
Burghers	106	6.95
Sinhalese	626	5.32
Tamils	131	2.35
Malays	16	2.66
Moors	54	1.33
Malayalees	376	30.13
Others	5	4.00

XXXIX.—MEASLES.

Measles again assumed epidemic proportions after an interval of three years. The last epidemic was in 1920 when there were 1,062 town cases. During the year under review the highest number of cases was recorded during the month of March as the following statement shows:—

(52) *Monthly Incidence of Measles.*

January	...	...	...	...	97
February	...	...	...	...	115
March	...	...	...	...	167
April	...	...	...	...	116
May	...	...	...	...	71
June	...	...	...	...	39
July	...	...	...	...	46
August	...	...	...	...	45
September	...	...	...	...	29
October	...	...	...	...	22
November	...	...	...	...	9
December	...	...	...	...	5
				Total	761

The total number of cases was 789, including one case from the Port, and 27 from outside town limits. Of these, 471 cases were of children under 10 years of age, 128 of children under 15 years of age, and 190 persons over 15 years of age. There were 16 deaths all of children under 10 years of age.

XL.—DIPHTHERIA.

There were 19 town cases and 8 outside cases during the year with 7 deaths. Of the 27 cases, 21 were of children under 12 years of age, 4 of children under 16 years of age, 2 only of adults.

XLI.—MISCELLANEOUS DISEASES.

Leprosy.

Three cases of leprosy were reported by the Public Health Department to the Principal Civil Medical Officer during the year for action to be taken under the Lepers Ordinance, No. 4 of 1901. Two of these cases were of the anaesthetic type, and the other one was of the tubercular type.

Mumps.

This is not a notifiable disease. Seventy-five cases were reported to this department during the year, and there was one death due to suppurative parotitis.

Whooping Cough.

There is reason to believe that there were a good many cases of whooping cough during the year, but as it is not a notifiable disease, only three cases were reported to this department, all of which were from the Lady Ridgeway Hospital for children. Five deaths were reported from this cause.

Tetanus.

Total 59 deaths; 52 adults and 7 infants. None of these infants had been attended at birth by Municipal Midwives.

Syphilis.—83 deaths; 24 adults and 59 infants.

Rabies.—3 deaths; 2 town cases and 1 outside case.

Cholera
Scarlet Fever
Typhus Fever
Beri-beri } There were no cases.

Public Health Department,
Colombo, March 31, 1924.

C. V. ASERAPPA,
Acting Medical Officer of Health.

(53) *Births and Deaths, with the Infant Mortality, for each Ward of the Town of Colombo during the Year 1923.*

Ward.	Total Births.		Nationality.										Total Deaths.		Nationality.										Deaths.				
	Persons.	Males.	Europeans.	Burgheers.	Sinhalese.	Tamils.	Moor's.	Malays.	Others.	Females.	Persons.	Males.	Burgheers.	Sinhalese.	Tamils.	Moor's.	Malays.	Others.	Infant Deaths.										
Colombo Town	7,107	3,624	3,483	93	505	4,311	954	245	144	8,893	4,818	4,075	45	366	4,856	1,659	1,366	276	325	1,929	—	3	15	12	—				
Fort and Galle Face	...	3	2	1	1	—	—	—	—	22	19	3	5	2	—	—	23	36	6	1	3	—	15	12	—				
Pettah	...	30	17	13	—	—	—	—	—	9	9	70	23	—	—	—	90	27	134	6	14	14	65	65	—				
San Sebastian	...	192	90	102	—	—	7	63	14	91	276	147	129	1	—	—	14	118	322	183	1	27	27	184	184	—			
St. Paul's	...	404	211	193	—	—	6	101	178	98	2	19	665	349	316	—	1	42	432	175	60	3	10	10	202	202	—		
Kotahena	...	636	314	322	—	—	63	381	135	38	7	12	723	375	348	1	—	18	355	54	39	5	7	7	121	121	—		
Mutwal	...	433	214	219	—	—	14	321	51	24	9	14	478	228	250	—	—	18	36	244	91	293	17	33	33	203	203	—	
New Bazaar	...	505	250	255	1	46	203	53	171	17	14	714	327	387	—	—	—	25	231	54	151	32	16	16	152	152	—		
Maradana North	...	402	225	177	2	41	159	59	113	21	21	7	509	250	259	—	—	20	25	231	54	151	32	16	16	152	152	—	
Maradana South	...	321	177	144	2	22	184	33	57	21	21	2	402	213	189	3	—	20	25	211	56	73	29	29	29	10	98	98	—
Dematagoda	...	449	236	213	5	48	263	37	70	19	19	7	402	211	191	2	—	38	254	32	53	16	16	7	7	133	133	—	
Slave Island	...	515	256	259	3	35	208	64	66	112	27	27	693	338	355	—	—	14	239	120	132	140	140	140	48	178	178	—	
Kollupitiya	...	229	118	111	17	13	137	26	18	10	8	201	99	102	3	—	7	125	29	23	7	7	7	7	53	53	—		
Cinnamon Gardens	...	93	41	52	19	5	46	16	5	1	1	1	216	120	96	6	10	10	131	53	14	14	14	14	14	2	20	20	—
Bambalapitiya	...	153	75	78	5	27	82	22	11	2	4	91	45	46	1	1	18	51	11	8	1	1	1	1	30	30	—		
Timbiringasyaya	...	185	93	92	9	14	5	34	145	43	30	8	—	3	155	79	76	4	3	125	17	3	3	3	3	3	45	45	—
Wellawatta	...	266	135	131	5	34	145	43	30	—	4	5	172	78	94	1	1	15	108	23	20	20	2	2	2	51	51	—	
Hospitals (Town residents)	...	2,291	1,170	1,121	19	135	1,864	197	54	12	10	8	1,100	375	250	125	3	7	278	65	16	2	2	2	2	88	88	4	
Hospitals (Untraced)	...	2,291	1,170	1,121	19	135	1,864	197	54	12	10	8	1,100	375	250	125	3	7	278	65	16	2	2	2	2	88	88	4	
Hospitals (Non-residents)	...	2,291	1,170	1,121	19	135	1,864	197	54	12	10	8	1,100	375	250	125	3	7	278	65	16	2	2	2	2	88	88	4	

(54) Deaths of Males and Females at different Age Periods for each Race in the Colombo Municipality during the Year 1923.

Age at Death.	Europeans.		Burghers.		Sinhalese.		Tamils.		Moors.		Malays.		Others.		All Races.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
Under 1 year of age (see particulars of statement) ...	3	3	51	40	577	517	165	173	140	143	44	28	22	23	1002	927
Under Five Years :—																
1 year and under 2 ...	1	—	15	11	191	192	46	41	56	69	16	19	7	6	332	338
2 years and under 3 ...	—	1	9	8	126	150	27	27	43	41	4	12	5	7	214	246
3 years and under 4 ...	—	—	2	4	66	95	15	18	14	27	3	5	2	5	192	154
4 years and under 5 ...	—	—	—	4	40	39	14	11	9	10	1	2	1	—	65	66
Over Five Years :—																
5 years and under 10 ...	—	—	5	7	82	95	22	29	13	34	5	10	2	2	129	177
10 years and under 15 ...	—	—	1	2	55	54	29	18	27	16	2	3	4	2	117	95
15 years and under 20 ...	1	—	5	8	116	89	51	32	44	32	8	6	12	1	237	168
20 years and under 25 ...	1	—	12	9	134	150	74	60	47	45	3	9	41	4	312	277
25 years and under 35 ...	3	1	13	13	246	271	156	85	56	49	9	2	66	8	549	429
35 years and under 45 ...	8	2	17	10	213	175	119	64	50	38	6	9	43	4	456	302
45 years and under 55 ...	7	3	16	13	206	135	96	39	55	23	8	5	20	1	408	219
55 years and under 65 ...	4	2	24	11	187	105	77	30	59	32	10	5	15	3	376	188
65 years and under 75 ...	—	3	18	8	125	110	35	23	42	27	9	10	4	1	233	182
75 years and under 85 ...	1	—	5	17	89	83	22	22	32	27	7	4	8	1	164	154
85 years and over ...	1	—	6	2	61	82	13	27	33	33	7	5	1	4	122	153
Total	30	15	199	167	2514	2342	960	699	720	646	142	134	253	72	4818	4075
Persons	45	—	366	—	4,856	—	1,659	—	1,366	—	276	—	325	—	8,893	—

(55) Infant Mortality. Deaths at different Age Periods and from Several Causes.

Cause of Death.	Age.												Race.								
	Age in Weeks.					Age in Months.															
	1	2	3	4	Total	2	3	4	5	6	7-9	10-12	Total	Europeans.	Burghers.	Sinhalese.	Tamils.	Moors.	Malays.	Others.	All Races.
I.—Development Diseases :—																					
1. Premature birth ...	170	15	7	5	197	5	—	—	1	—	—	—	6	2	5	162	21	9	1	3	203
2. Atalectasis ...	1	1	—	—	2	—	—	—	—	—	—	—	1	—	—	—	—	1	—	—	2
3. Atrophy and debility ...	143	41	31	37	252	65	34	22	26	18	28	15	208	15	224	103	79	26	13	460	
4. Others ...	5	2	1	—	8	2	2	—	1	1	3	3	12	1	14	2	1	1	1	1	20
II.—Diseases of Respiratory System :—																					
1. Laryngitis ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
2. Croup ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
3. Bronchitis ...	—	—	3	5	8	9	12	9	6	7	12	6	61	8	33	14	13	1	1	69	
4. Pneumonia ...	2	—	1	8	11	15	22	16	19	22	63	26	183	12	119	21	27	10	5	194	
5. Others ...	—	—	—	—	—	1	2	—	—	1	—	—	4	4	—	—	—	—	—	4	
III.—Diseases of Digestive System :—																					
1. Diarrhoeal ...	3	1	5	10	19	34	29	21	13	18	58	21	194	1	15	119	29	31	12	6	213
2. Dentition ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
3. Others ...	3	2	3	9	17	8	7	4	3	2	—	1	32	1	3	32	6	4	2	1	49
IV.—Diseases of Nervous System :—																					
1. Convulsions ...	107	45	25	23	200	77	46	31	30	31	45	20	280	1	22	224	109	101	13	10	480
2. Laryngismus stridulus.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
3. Tetanus ...	3	2	2	—	7	—	—	—	—	—	—	—	—	2	3	—	1	1	1	7	
4. Others ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
V.—Tuberculous Diseases :—																					
1. Tabes mesenterica ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
2. Tubercular meningitis.	—	—	—	—	—	—	—	—	—	—	—	—	—	3	2	1	—	—	—	6	
3. Others ...	2	—	1	—	3	—	—	—	—	—	—	—	—	1	1	3	—	—	—	4	
VI.—Accidents :—																					
1. Injury ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
2. Umbilical haemorrhage	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
3. Suffocation ...	1	—	—	—	1	—	—	—	—	—	—	—	—	—	1	—	—	1	—	1	
4. Other violence ...	11	1	—	—	12	—	—	—	—	—	—	—	—	1	—	13	—	—	—	13	
VII.—Infectious Diseases :—																					
1. Smallpox ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
2. Chickenpox ...	—	—	1</																		

(56) Causes of Deaths registered in Colombo during the Year 1923.

Nationality.

Causes of Deaths.	All Causes.	Colombo Town.	Europeans.	Burgers.	Sinhalese.	Tamil.	Moors.	Malays.	Others.	Nationality.						
										8,893	45	366	4,856	1,659	1,366	276	325
I.—General Diseases:—																
1.—Epidemic Diseases	...	1,305	5	52	635	304	203	29	77	...						
2.—Septic Diseases	...	81	2	3	52	16	8	—	—	—						
3.—Tuberculous Diseases	...	836	2	31	439	161	137	30	36	...						
4.—Venereal Diseases	...	84	—	2	67	5	7	2	1	...						
5.—Cancer or Malignant Diseases	...	76	3	4	47	11	9	1	1	...						
6.—Other General Diseases	...	214	1	9	124	43	24	6	7	...						
II.—Diseases of the Nervous System and Organs of Special Sense																
...	937	5	46	478	179	179	30	20	...	...				
III.—Diseases of the Circulatory System																
...	243	4	20	139	37	32	2	9	...	...				
IV.—Diseases of the Respiratory System																
...	1,533	2	63	863	292	203	45	65	...	...				
V.—Diseases of the Digestive System																
...	1,250	9	51	730	212	168	36	44	...	...				
VI.—Non-venereal Diseases of the Genito-Urinary and Annexa																
...	267	2	8	143	46	53	10	5	...	...				
VII.—The Puerperal State																
...	141	—	7	69	34	25	2	4	...	...				
VIII.—Diseases of the Skin and of the Cellular Tissue																
...	101	1	3	68	16	9	1	3	...	...				
IX.—Diseases of the Bones and of the Organs of Locomotion																
...	1	—	—	1	—	—	—	—	—	...						
X.—Malformations																
...	9	1	1	6	—	2	—	—	—	...						
XI.—Diseases of Early Infancy																
...	615	3	18	367	117	79	18	13	...	...				
XII.—Old Age																
...	557	1	25	276	85	131	29	10	...	...				
XIII.—Affections produced by External Causes:—																
1.—Suicide	...	10	1	2	5	—	1	1	1	...						
2.—Homicide	...	24	—	1	13	6	1	—	3	...						
3.—Judicial Hanging or Execution	...	22	—	—	19	1	1	—	1	...						
4.—Accident and other External Violence.	126	2	6	67	27	14	—	—	10	...						
XIV.—Ill-defined Diseases																
...	461	2	14	248	67	80	35	15	...	...				

I.—GENERAL DISEASES.

<i>Epidemic Diseases.</i>	1.—Enteric Fever	...	269	3	17	185	31	12	3	18
	2.—Typhus Fever	...	—	—	—	—	—	—	—	—
	3.—Relapsing Fever	...	—	—	—	—	—	—	—	—
	4.—(a) Ague	...	2	—	1	—	1	—	—	—
	4.—(b) Malaria	...	136	—	6	73	31	17	3	6
	4.—(c) Malarial Cachexia	...	28	—	1	15	7	2	3	—
	5.—Smallpox (a) Vaccinated	...	1	—	—	1	—	—	—	—
	5.—Smallpox (b) Not Vaccinated	...	—	—	—	—	—	—	—	—
	5.—Smallpox (c) Doubtful	...	—	—	—	—	—	—	—	—
	6.—Measles	...	16	—	2	12	—	2	—	—
	7.—Scarlet Fever	...	—	—	—	—	—	—	—	—
	8.—Whooping Cough	...	5	—	—	4	—	1	—	—
	8.—(a) Diphtheria	...	7	—	1	6	—	—	—	—
	9.—(b) Membranous Laryngitis	...	—	—	—	—	—	—	—	—
	9.—(c) Croup	...	—	—	—	—	—	—	—	—
	10.—Influenza	...	317	—	13	125	76	72	11	20
	11.—Miliary Fever	...	—	—	—	—	—	—	—	—
	12.—Asiatic Cholera	...	—	—	—	—	—	—	—	—
	13.—Cholera Nostras	...	—	—	—	—	—	—	—	—
	14.—(a) Amœbic Dysentery	...	4	1	—	2	1	—	—	—
	14.—(b) Bacillary Dysentery	...	5	—	1	2	1	—	—	1
	14.—(c) Dysentery (type not distinguished)	300	1	7	156	77	40	6	13	—
	15.—Plague	...	204	—	2	46	78	56	3	19
	16.—Yellow Fever	...	—	—	—	—	—	—	—	—
	17.—Leprosy	...	1	—	—	1	—	—	—	—
	18.—Erysipelas	...	8	—	1	5	1	1	—	—
	19.—(a) Mumps	...	1	—	—	1	—	—	—	—
	19.—(b) Varicella (Chickenpox)	...	—	—	—	—	—	—	—	—
	19.—(c) Other Epidemic Diseases	...	—	—	—	—	—	—	—	—
	20.—(a) Pyæmia	...	10	—	—	7	2	1	—	—
	20.—(b) Septicæmia	71	2	3	45	14	7	—	—	—
	20.—(c) Vaccinia	...	—	—	—	—	—	—	—	—
	21.—Glanders	...	—	—	—	—	—	—	—	—
	22.—Anthrax	...	—	—	—	—	—	—	—	—
	23.—Rabies, Hydrophobia	...	3	—	—	1	2	—	—	—
	24.—Tetanus	...	59	—	—	30	18	7	2	2
	25.—Mycoses	...	—	—	—	—	—	—	—	—
	26.—Pellagra	...	—	—	—	—	—	—	—	—
	27.—Beri-Beri	...	—	—	—	—	—	—	—	—
	28.—(a) Acute Pulmonary Tuberculosis	721	2	28	373	137	122	27	32	—
	28.—(b) Chronic Pulmonary Tuberculosis	—	—	—	—	—	—	—	—	—
	29.—Acute Miliary Tuberculosis	...	6	—	1	5	—	—	—	—
	30.—Tuberculous Meningitis	...	7	—	—	3	3	1	—	—
	31.—Abdominal Tuberculosis	...	15	—	—	12	2	1	—	—
	32.—Tuberculosis of the Spine	...	1	—	—	—	1	—	—	—
	33.—Tuberculosis of Joints	...	—	—	—	—	—	—	—	—
	34.—Tuberculosis of other Organs (Lymphatism excepted)	...	81	—	2	42	17	13	3	4
	35.—Disseminated Tuberculosis	...	5	—	—	4	1	—	—	—
	36.—Rickets	...	49	—	1	36	5	4	2	1

(56) *Causes of Deaths, &c.—contd.**Cancer or Malignant Diseases.*

Causes of Deaths.

39.—Cancer and other malignant Tumours of the Buccal Cavity ...
 40.—Cancer and other malignant Tumours of the Stomach, Liver ...
 41.—Cancer and other malignant Tumours of the Peritoneum, Intestines, Rectum ...
 42.—Cancer and other malignant Tumours of the Female Genital Organs ...
 43.—Cancer and other malignant Tumours of the Breast ...
 44.—Cancer and other malignant Tumours of the Skin ...
 45.—Cancer and other malignant Tumours of other Organs or of Organs not specified ...
 46.—Other Tumours (Tumours of the Female Genital Organs excepted) ...
 47.—Acute Rheumatic Fever ...
 48.—
 (a) Rheumatoid Arthritis ...
 (b) Osteo-Arthritis ...
 (c) Chronic Rheumatism ...
 (d) Gout ...
 49.—Scurvy ...
 50.—Diabetes (Mellitus) ...
 51.—Exophthalmic Goitre ...
 52.—Addison's Disease ...
 53.—
 (a) Leucocytæmia ...
 (b) Lymphadenoma ...
 (c) Anæmia ...
 (d) Chlorosis ...
 (a) Diabetes Insipidus ...
 (b) Purpura ...
 (c) Hæmophilia ...
 (d) Other General Diseases ...
 56.—Alcoholism (acute or chronic) ...
 57.—Chronic Lead Poisoning ...
 58.—Other Chronic Poisonings (occupational) ...
 59.—Other Chronic Poisonings (non-occupational) ...

											Nationality.
		Colombo Town.	Europeans.	Burghers.	Sinhalese.	Tamils.	Moors.	Malays.	Others.		
39.—	Cancer and other malignant Tumours of the Buccal Cavity	27	—	...	16	6	5	—	—	1	
40.—	Cancer and other malignant Tumours of the Stomach, Liver	14	1	2	7	1	2	—	—	1	
41.—	Cancer and other malignant Tumours of the Peritoneum, Intestines, Rectum	9	1	1	4	2	1	—	—	1	
42.—	Cancer and other malignant Tumours of the Female Genital Organs	6	—	—	5	—	1	—	—	1	
43.—	Cancer and other malignant Tumours of the Breast	1	—	—	1	—	—	—	—	1	
44.—	Cancer and other malignant Tumours of the Skin	1	—	—	1	—	—	—	—	1	
45.—	Cancer and other malignant Tumours of other Organs or of Organs not specified	18	1	1	13	2	—	1	—	1	
46.—	Other Tumours (Tumours of the Female Genital Organs excepted)	14	—	1	9	3	—	—	—	1	
47.—	Acute Rheumatic Fever	1	—	—	1	—	—	—	—	—	
48.—	 (a) Rheumatoid Arthritis	—	—	—	—	—	—	—	—	—	
	(b) Osteo-Arthritis	—	—	—	—	—	—	—	—	—	
	(c) Chronic Rheumatism	7	1	—	4	1	1	—	—	—	
	(d) Gout	—	—	—	—	—	—	—	—	—	
49.—	Scurvy	2	—	—	2	—	—	—	—	—	
50.—	Diabetes (Mellitus)	54	—	5	30	9	8	1	—	1	
51.—	Exophthalmic Goitre	1	—	—	1	—	—	—	—	—	
52.—	Addison's Disease	—	—	—	—	—	—	—	—	—	
53.—	 (a) Leucocytæmia	—	—	—	—	—	—	—	—	—	
	(b) Lymphadenoma	—	—	—	—	—	—	—	—	—	
	(c) Anæmia	20	—	1	7	5	4	—	1	2	
	(d) Chlorosis	—	—	—	—	—	—	—	—	—	
	(a) Diabetes Insipidus	—	—	—	—	—	—	—	—	—	
	(b) Purpura	—	—	—	—	—	—	—	—	—	
	(c) Hæmophilia	—	—	—	—	—	—	—	—	—	
	(d) Other General Diseases	2	—	1	2	—	—	—	—	—	
56.—	Alcoholism (acute or chronic)	1	—	—	—	—	—	—	—	—	
57.—	Chronic Lead Poisoning	—	—	—	—	—	—	—	—	—	
58.—	Other Chronic Poisonings (occupational)	—	—	—	—	—	—	—	—	—	
59.—	Other Chronic Poisonings (non-occupational)	—	—	—	—	—	—	—	—	—	

II.—DISEASES OF THE NERVOUS SYSTEM AND OF THE ORGANS OF SPECIAL SENSE.

60.—	Eucephalitis	...	4	1	2	—	—	—	1	1	
	 (a) Simple Meningitis	39	—	—	24	8	5	1	—	1	
61.—	 (b) Cerebro-Spinal Fever	—	—	—	—	—	—	—	—	—	
	 (c) Septic Meningitis from various causes	1	—	—	1	—	—	—	—	—	
62.—	Locomotor Ataxia	—	—	—	—	—	—	—	—	—	
63.—	Other Diseases of the Spinal Cord	9	—	—	7	1	—	—	1	—	
64.—	Cerebral Hæmorrhage, Apoplexy	74	3	12	34	14	9	2	—	—	
65.—	Softening of the Brain	—	—	—	—	—	—	—	—	—	
66.—	Paralysis without specified cause	119	—	6	77	14	18	2	—	—	
67.—	General Paralysis of the Insane	—	7	—	6	1	—	—	—	—	
68.—	Other forms of mental alienation	—	18	1	9	3	4	1	—	—	
69.—	Epilepsy	—	177	5	88	27	42	9	—	6	
70.—	Convulsions (non-puerperal)	480	1	22	224	109	101	13	—	10	
71.—	Convulsions of Infants	—	—	—	—	—	—	—	—	—	
72.—	Chorea	—	—	—	—	—	—	—	—	—	
73.—	Neuralgia and Neuritis	—	—	—	—	—	—	—	—	—	
74.—	Other Diseases of the Nervous System	6	—	—	5	1	—	—	—	—	
75.—	Diseases of the Eyes and their Annexa	—	—	—	—	—	—	—	—	—	
76.—	 (a) Mastoid Disease	1	—	—	1	—	—	—	—	1	
	 (b) Other Diseases of the Ears	2	—	—	1	1	—	—	—	—	

III.—DISEASES OF THE CIRCULATORY SYSTEM.

77.—	Pericarditis	...	5	1	3	1	—	—	—	—	
	 (a) Simple Acute Endocarditis	4	—	—	3	1	—	—	—	—	
78.—	 (b) Infective Endocarditis	—	—	—	—	—	—	—	—	—	
	 (a) Myocarditis	11	2	2	4	—	—	3	—	1	
79.—	 (b) Valvular Disease	24	—	—	12	8	3	—	—	—	
	 (c) Other Organic Diseases of the Heart	136	1	6	83	23	20	1	—	2	
80.—	Angina Pectoris	—	7	2	2	—	3	—	—	—	
	 (a) Aneurism	2	1	—	—	1	—	—	—	2	
81.—	 (b) Atheroma, Arteriosclerosis	8	—	2	4	—	—	—	—	—	
	 (c) Other Diseases of the Arteries	—	—	—	—	—	—	—	—	—	
	 (a) Cerebral Embolism and Thrombosis	14	—	2	8	2	2	—	—	—	
82.—	 (b) Embolism and Thrombosis other than Cerebral	—	8	1	6	—	—	—	—	1	
	 (a) Phlebitis	2	—	1	1	—	—	—	—	—	
83.—	 (b) Varicose Veins	—	7	1	3	—	—	1	—	2	
	 (c) Hæmorrhoids	—	—	—	—	—	—	—	—	—	
	 (d) Other Diseases of the Veins	—	—	—	—	—	—	—	—	—	
84.—	 (a) Lymphatism, Status Lymphaticus	1	—	—	1	—	—	—	—	—	
	 (b) Elephantiasis Arabum (Filariasis)	—	—	—	—	—	—	—	—	—	
	 (c) Other Diseases of the Lymphatic System	2	—	1	2	—	—	—	—	—	

(56) *Causes of Deaths, &c.*—contd.

Causes of Deaths.	Nationality.							
	Colombo Town.	Europeans.	Burghers.	Sinhalese.	Tamils.	Moors.	Malays.	Others.
85.—{(a) Hæmorrhage from any part (b) Other Diseases of the Circulatory System	7 ...	—	1 ...	4 ...	1 ...	1 ...	1 ...	1 ...
IV.—DISEASES OF THE RESPIRATORY SYSTEM.	5 ...	—	1 ...	3 ...	—	—	—	—
86.—Diseases of the Nose	—	—	—	—	—	—	—	—
87.—{(a) Laryngismus Stridulus (b) All forms of Laryngitis (Diph- theritic excepted) (c) Other Diseases of the Larynx	1 ...	—	—	—	—	—	—	—
88.—Diseases of the Thyroid Body	3 ...	—	—	3 ...	—	—	—	—
89.—Acute Bronchitis	139 ...	—	12 ...	64 ...	29 ...	27 ...	2 ...	5 ...
90.—{(a) Chronic Bronchitis ... (b) Bronchiectasis ...	49 ...	—	2 ...	25 ...	13 ...	7 ...	—	2 ...
91.—Broncho-Pneumonia	5 ...	—	—	4 ...	1 ...	—	—	—
92.—Pneumonia	541 ...	1 ...	23 ...	333 ...	75 ...	73 ...	22 ...	14 ...
93.—{(a) Empyema ... (b) Other Pleurisy ...	13 ...	—	—	10 ...	—	2 ...	—	1 ...
94.—Pulmonary Congestion, Pulmonary Apoplexy ...	15 ...	—	2 ...	5 ...	5 ...	1 ...	—	2 ...
95.—Gangrene of the Lungs	710 ...	1 ...	20 ...	383 ...	156 ...	90 ...	21 ...	39 ...
96.—Asthma	19 ...	—	1 ...	16 ...	2 ...	—	—	—
97.—Pulmonary Emphysema	—	—	—	—	—	—	—	—
98.—Other Diseases of the Respiratory System (Tuberculosis excepted)	11 ...	—	2 ...	8 ...	1 ...	—	—	—
V.—DISEASES OF THE DIGESTIVE SYSTEM.	—	—	—	—	—	—	—	—
99.—{(a) Diseases of the Teeth and Gums (Oral Sepsis) (b) Thrush, Stomatitis	—	—	—	—	—	—	—	—
100.—{(c) Parotitis (Septic) (d) Other Diseases of the Mouth and Annexa	19 ...	—	—	—	15 ...	—	3 ...	1 ...
101.—{(a) Tonsillitis (other than Diphtheritic) ... (b) Quinsy	3 ...	—	1 ...	—	1 ...	—	1 ...	—
102.—{(c) Other Diseases of the Pharynx	1 ...	—	—	—	1 ...	—	—	—
103.—Diseases of the Oesophagus	—	—	—	—	—	—	—	—
104.—Gastric Ulcer	2 ...	—	—	—	1 ...	1 ...	—	—
105.—{(a) Gastritis, Gastric Catarrh ... (b) Other Diseases of the Stomach (Cancer excepted)	17 ...	—	—	1 ...	8 ...	5 ...	1 ...	2 ...
106.—{(a) Epidemic Diarrhoea ... (b) Diarrhoea Infantile, Diarrhoea due to food	7 ...	—	—	—	5 ...	1 ...	—	1 ...
107.—{(c) Diarrhoea undefined ... & {(d) Enteritis	2 ...	—	—	—	1 ...	—	1 ...	—
108.—{(e) Gastro-enteritis ... (f) Colic	39 ...	—	—	5 ...	22 ...	5 ...	5 ...	2 ...
109.—{(g) Intestinal Ulceration, Colitis ... (h) Duodenal Ulcer	174 ...	—	—	4 ...	96 ...	36 ...	28 ...	3 ...
110.—{(i) Diarrhoea undefined ... & {(j) Enteritis	389 ...	1 ...	15 ...	227 ...	62 ...	58 ...	14 ...	12 ...
111.—{(k) Gastro-enteritis ... (l) Colic	77 ...	—	1 ...	10 ...	39 ...	11 ...	11 ...	2 ...
112.—{(m) Intestinal Ulceration, Colitis ... (n) Duodenal Ulcer	32 ...	—	3 ...	2 ...	11 ...	9 ...	6 ...	—
113.—{(o) Intestinal Ulceration, Colitis ... (p) Duodenal Ulcer	—	—	—	—	—	—	—	—
114.—{(q) Diarrhoea undefined ... & {(r) Enteritis	135 ...	—	—	—	94 ...	27 ...	9 ...	3 ...
115.—{(s) Gastro-enteritis ... (t) Colic	171 ...	—	—	4 ...	115 ...	19 ...	21 ...	8 ...
116.—{(u) Intestinal Ulceration, Colitis ... (v) Duodenal Ulcer	10 ...	—	—	—	7 ...	2 ...	—	—
117.—{(w) Hernia ... (x) Intestinal Obstruction	19 ...	—	—	1 ...	8 ...	4 ...	4 ...	1 ...
118.—{(y) Psoriasis (Sprue or Ceylon Sore-mouth) ... (z) Other Diseases of the Intestine	14 ...	—	1 ...	—	6 ...	2 ...	4 ...	2 ...
119.—{(aa) Acute Yellow Atrophy of the Liver ... (bb) Hydatid Tumour of the Liver	8 ...	—	1 ...	—	4 ...	3 ...	3 ...	—
120.—{(cc) Cirrhosis of the Liver (Alcoholic) ... (dd) Cirrhosis of the Liver (Toxic)	11 ...	—	—	—	5 ...	3 ...	3 ...	—
121.—{(ee) Gallstones ... (ff) Other Diseases of the Liver	7 ...	—	—	—	3 ...	2 ...	2 ...	—
122.—{(gg) Diseases of the Spleen ... (hh) Peritonitis (cause unknown)	19 ...	—	—	1 ...	6 ...	6 ...	2 ...	4 ...
123.—{(ii) Other Diseases of the Digestive System (Cancer and Tuberculosis excepted)	1 ...	—	—	—	—	—	—	—
VI.—NON-VENEREAL DISEASES OF THE GENITO- URINARY SYSTEM AND ANNEXA.	32 ...	—	—	3 ...	21 ...	6 ...	1 ...	1 ...
124.—{(jj) Acute Nephritis ... (kk) Bright's Disease	15 ...	—	1 ...	6 ...	3 ...	3 ...	1 ...	1 ...
125.—{(ll) Chyluria ... (mm) Other Diseases of the Kidneys and Annexa	184 ...	2 ...	4 ...	91 ...	33 ...	42 ...	9 ...	3 ...
126.—{(nn) Urinary Calculi ... (oo) Diseases of the Bladder	26 ...	—	2 ...	15 ...	5 ...	2 ...	1 ...	1 ...
127.—{(pp) Diseases of the Urethra, Urinary Abscess, &c. (qq) Diseases of the Prostate	32 ...	—	1 ...	19 ...	5 ...	6 ...	—	—
128.—{(rr) Diseases of the Male Genital Organs (non- venereal) ... (ss) Uterine Haemorrhage (non-puerperal)	7 ...	—	—	6 ...	—	—	—	—
129.—{(tt) Uterine Tumour (non-cancerous) ... (uu) Other Diseases of the Uterus	2 ...	—	—	—	—	—	—	—
130.—{(vv) Cysts and other Tumours of the Ovary ... (ww) Salpingitis and other Diseases of the Female Genital Organs	5 ...	—	—	5 ...	—	—	—	—
131.—{(xx) Non-puerperal Diseases of the Breast (Cancer excepted)	2 ...	—	—	1 ...	—	1 ...	—	—
132.—{(yy) Non-puerperal Diseases of the Breast (Cancer excepted)	3 ...	—	—	1 ...	2 ...	—	—	—

(56) *Causes of Deaths, &c.—contd.*

	Causes of Deaths.	Colombo Town.	Europeans.	Burghers.	Sinhalese.	Tamil.	Nationality.		
							Moors.	Malays.	Others.
VII.—THE PUERPERAL STATE.									
134.—	{(a) Abortion, Miscarriage (b) Ante-partum Hæmorrhage (c) Ectopic Gestation ... (d) Other Accidents of Pregnancy	...	1 ... 1 ... 3 ... 9 ...	— ... — ... — ... — ...	— ... — ... — ... 1 ...	1 ... 1 ... 3 ... 6 ...	— ... — ... — ... 2 ...	— ... — ... — ... — ...	— ... — ... — ... — ...
135.—	Puerperal Hæmorrhage ...	...	3 ...	— ...	— ...	1 ...	1 ...	1 ...	— ...
136.—	Other Accidents of Childbirth	...	2 ...	— ...	— ...	—	2 ...	—	— ...
137.—	Puerperal Septicæmia ...	...	82 ...	— ...	4 ...	43 ...	19 ...	13 ...	2 ...
138.—	{(a) Puerperal Albuminuria, Nephritis, &c. (b) Puerperal Eclampsia	— ... 12 ...	— ... — ...	— ... — ...	— ... — ...	5 ...	2 ...	3 ...	— ...
139.—	{(a) Puerperal Phlegmasia, Alba Dolens ... (b) Puerperal Embolism, Sudden Death, &c.	— ... — ...	— ... — ...	— ... — ...	— ... — ...	—	—	—	— ...
140.—	{(a) Puerperal Insanity ... (b) Consequences of Childbirth (not otherwise defined)	— ... 28 ...	— ... — ...	— ... 2 ...	— ... 9 ...	—	8 ...	8 ...	— ...
141.—	Puerperal Diseases of the Breast	...	— ...	— ...	— ...	—	—	—	— ...
VIII.—DISEASES OF THE SKIN AND OF THE CELLULAR TISSUE.									
142.—	Gangrene ...	...	37 ...	— ...	— ...	25 ...	6 ...	4 ...	— ...
143.—	{(a) Carbuncle ... (b) Furuncle (Boil) ...	...	2 ... 2 ...	1 ... — ...	— ... — ...	—	—	1 ...	— ...
144.—	{(a) Phlegmon ... (b) Acute Abscess, Abscess unqualified ...	— ... 14 ...	— ... — ...	— ... — ...	— ... — ...	—	—	—	— ...
145.—	{(a) Ulcer, Bedsore ... (b) Eczema ... (c) Pemphigus ... (d) Other Diseases of the Integumentary System (Elephantiasis Arabum excepted)	...	12 ... 1 ... 2 ...	— ... — ... — ...	1 ... 1 ... 1 ...	7 ... 1 ... 1 ...	3 ... 1 ... —	1 ... —	— ...
IX.—DISEASES OF THE BONES AND OF THE ORGANS OF LOCOMOTION.									
146.—	Diseases of the Bones (Tuberculosis and Mastoid Disease excepted) ...	...	—	1 ...	— ...	1 ...	—	—	— ...
147.—	Diseases of the Joints (Tuberculosis and Rheumatism excepted) ...	...	—	—	—	—	—	—	— ...
148.—	Amputations ...	...	—	—	—	—	—	—	— ...
149.—	Other Diseases of the Organs of Locomotion.	—	—	—	—	—	—	—	— ...
X.—MALFORMATIONS.									
150.—	{(a) Congenital Hydrocephalus ... (b) Congenital Diseases of the Heart ... (c) Other Congenital Malformation (Still-births excluded) ...	...	3 ... — ... 6 ...	— ... — ... — ...	1 ... — ... — ...	1 ... — ... 5 ...	— ... — ... —	1 ... — ... 1 ...	— ... — ... —
XI.—DISEASES OF EARLY INFANCY.									
151.—	{(a) Premature Birth ... (b) Debility ... (c) Want of Breast Milk ... (d) Atrophy, Icterus, Sclerema Neonatorum	...	203 ... 364 ... 34 ... 6 ...	2 ... — ... — ... — ...	5 ... 13 ... 20 ... 1 ...	162 ... 178 ... 9 ... 1 ...	21 ... 86 ... 5 ... 1 ...	9 ... 63 ... — ... 2 ...	1 ... 15 ... — ... 1 ...
152.—	{(a) Atelectasis ... (b) Injuries at Birth ... (c) Other Diseases peculiar to early Infancy	...	2 ... 2 ... 4 ...	1 ... — ... — ...	— ... — ... — ...	—	—	—	— ...
153.—	Lack of care ...	...	—	—	—	—	—	—	— ...
XII.—OLD AGE.									
154.—	Senility ...	...	557 ...	1 ...	25 ...	276 ...	85 ...	131 ...	29 ...
XIII.—AFFECTIONS PRODUCED BY EXTERNAL CAUSES.									
155.—	Suicide by Poison ...	...	—	4 ...	— ...	1 ...	2 ...	—	— ...
156.—	Suicide by Asphyxia ...	...	—	—	—	—	—	—	— ...
157.—	Suicide by Hanging or Strangulation ...	...	—	2 ...	—	—	1 ...	—	— ...
158.—	Suicide by Drowning ...	...	—	—	—	—	—	—	— ...
159.—	Suicide by Firearms ...	...	—	1 ...	1 ...	—	—	—	— ...
160.—	Suicide by Cutting or Piercing Instruments.	...	—	1 ...	—	—	1 ...	—	— ...
161.—	Suicide by Jumping from high places	...	—	—	—	—	—	—	— ...
162.—	Suicide by Crushing ...	...	—	—	—	—	—	—	— ...
163.—	Suicide by other means ...	...	—	2 ...	—	1 ...	1 ...	—	— ...
164.—	Poisoning by Food ...	...	—	—	—	—	—	—	— ...
165.—	{(a) Snake-bite ... (b) Insect Stings (Venomous) ... (c) Other Acute Poisonings ...	...	—	—	—	—	—	—	— ...
166.—	Conflagration ...	...	—	—	—	—	—	—	— ...
167.—	Burns (Conflagration excepted) ...	...	—	18 ...	—	1 ...	10 ...	2 ...	4 ...
168.—	Absorption of Deleterious Gases (Conflagration excepted) ...	...	—	1 ...	—	—	—	—	— ...
169.—	Accidental Drowning ...	...	—	20 ...	—	1 ...	5 ...	9 ...	3 ...
170.—	Traumatism by Firearms ...	...	—	—	—	—	—	—	— ...
171.—	Traumatism by Cutting or Piercing Instruments	...	—	2 ...	—	—	2 ...	—	— ...

(56) *Causes of Deaths, &c.*—contd.

	Causes of Deaths.	Nationality.									
		Colombo Town.	Europeans.	Burghers.	Sinhalese.	Tamils.	Moors.	Malays.	Others.		
172.—	(a) Traumatism by Fall from trees ...	6	...	—	...	4	...	...	1	...	1
	(b) Traumatism by Fall from heights other than trees ...	2	...	—	—	1	...	—	—	—	—
	(c) Traumatism by other Accidental Fall. ...	10	...	—	—	7	...	2	—	1	1
173.—	Traumatism in Mines and Quarries ...	2	...	—	—	2	...	—	—	—	—
174.—	Traumatism by Machines ...	1	...	1	—	—	—	—	—	—	—
175.—	Traumatism by Other Crushing (Vehicles, Railroad Landslides, &c.) ...	35	...	1	—	16	...	9	5	—	3
176.—	Injuries by Animals ...	2	...	—	—	2	...	—	—	—	—
177.—	Starvation ...	13	...	—	—	9	...	3	—	—	1
178.—	Excessive Cold ...	—	—	—	—	—	—	—	—	—	—
179.—	Effects of Heat ...	—	—	—	—	—	—	—	—	—	—
180.—	Lightning ...	—	—	—	—	—	—	—	—	—	—
181.—	Electricity (Lightning excepted) ...	—	—	—	—	—	—	—	—	—	—
182.—	Homicide by Firearms ...	2	...	—	—	2	...	—	—	—	—
183.—	Homicide by Cutting or Piercing Instruments ...	14	...	—	—	5	...	5	—	1	3
184.—	Homicide by other means ...	8	...	—	1	6	...	1	—	—	—
185.—	Fractures (cause not specified) ...	6	...	—	—	4	...	1	—	—	1
186.—	(a) Judicial Hanging or Execution ...	22	...	—	—	19	...	1	1	—	1
	(b) Other External Violence ...	5	...	—	1	3	...	1	—	—	1

XIV.—ILL-DEFINED DISEASES.

Annexure A.

REPORT OF THE MEDICAL OFFICER OF THE MUNICIPAL ENTERIC HOSPITAL FOR 1923.

I HAVE the honour to submit the following report of the Municipal Enteric Hospital for the year 1923.

The total number of cases treated during the year was 90, as against 66 during the previous year. The daily average sick for the year 5.11, as against 3.64 during the previous year.

Of the 90 cases, 37 were males and 53 females; and of these, 74 were cured and discharged. Thirteen died giving a percentage of 14.44 of the total treated, as against 18.18 during the previous year, and 4 remained at the end of the year.

Of the 90 cases, 55 were enteric, and the remaining 35 were other diseases, malaria, dysentery, diarrhoea, influenza, &c.

Of the 55 enteric patients, 27 were males and 28 females. Of the enteric cases, 31 were sent from the Lady Havelock Hospital, 7 by Municipal Inspectors, one by a rural Inspector, 3 came voluntarily, 8 from the General Hospital, 3 by the Medical Officer of St. Paul's, and 2 from the Police Hospital.

Of the total enteric cases treated, 40 were cured and discharged, 11 died giving a mortality of 20 per cent. and 4 remaining, as against 20 per cent. of the previous year. It has to be mentioned that some of the enteric cases were admitted in a serious condition. There were few cases which died within 24 hours after admission. A statement of the distribution of the town cases admitted into hospital is annexed, and a report of the bacteriological examinations of the specimen sent.

Two of the unused wards, Nos. 3 and 4, have been given over to Government for treating cases from outside the town limits during the latter part of the year.

As the Apothecary is not provided with quarters within the hospital premises, it is not convenient for him to always be in the hospital, and consequently I have to attend to his duties when he is away.

It would be advisable if funds permit and if the hospital is to be a permanent establishment, to provide quarters for the servants also.

I have to mention the excellent work done by the matron in attending cases day and night whenever there are bad cases in the hospital.

I also take this opportunity of mentioning the very satisfactory manner the staff on the whole have been discharging their duties during the year.

Municipal Enteric Hospital,
Colombo, January 16, 1924.

K. K. JACOB,
Medical Officer.

(57) *Bacteriological Examination of the samples sent from the Patients of the Municipal Enteric Hospital during the year 1923.*

Materials sent for Examination.	To be Examined for.	Result of Examination.	
		Positive.	Negative.
82 Finger blood	Widal	49	33
37 Faeces	B. Typhosus	Nil	37
29 Urine	B. Typhosus	Nil	29
6 Blood slides	Malaria parasites	2	4
2 Sputum	Tubercle bacilli	Nil	2

ENTERIC HOSPITAL, 1923.

(58) *Number of Patients Treated.*

	Enteric.	Other diseases.	Total.
Number of patients sent by Municipal Inspectors	7	9	16
General Hospital, Lady Havelock and other hospitals	41	23	64
Voluntarily seeking admission	3	3	6
Sent by Municipal Dispensary Medical Officers	3	—	3
Sent by rural Inspector	1	—	1
	<hr/>	<hr/>	<hr/>
Total	55	35	90

(59) *Work done at the Municipal Enteric Hospital.*

Number of patients remaining from previous year	...	...	5
Number of admissions during the year	...	...	89
Number of deaths	...	...	13
Number of discharged cured	...	...	77
Case mortality per cent.	...	...	13.8

Annexure B.

REPORT OF THE MUNICIPAL BACTERIOLOGIST FOR 1923.

MY assistant, Mr. C. A. Woutersz, carried on the routine work and administration of the laboratory during my absence on seven months' leave out of the Island. The premises and equipment were well maintained.

Mr. A. C. Mortier has been appointed on probation to the revived post of Junior Laboratory Assistant. He had already served a short period as extra assistant under the Hookworm Research Fund provided by the Rockefeller Foundation.

The nature of the work done is indicated in the subjoined tables. It was very similar in character to that of the previous year.

Distribution of Clinical Specimens.

	Examined for.	Number received.	Number Positive.
Diagnostic service for practitioners	Enteric	99	34
	Tuberculosis	34	6
	Dysentery	14	5
	Diphtheria	14	6
	Hookworm	60	30
	Malaria	10	4
Municipal Enteric Hospital	Various	61	38
	Enteric	155	54
	Malaria	6	3
	Hookworm	1	1
	Tuberculosis	2	0
	Enteric	438	0
Public Health Department	Human plague	64	29
	Hookworm	4	4
	Various	4	0
		966	214

Of the 692 enteric specimens, 586 comprised finger bloods for Widal's reaction, 56 faeces, and 50 urines. *B. Typhosus* was isolated on five occasions from faeces. No *Paratyphosus A.* or *B.* were isolated this year.

(a) General Distribution of Specimens Examined during 1923.

Clinical specimens	...	...	...	966
Town water	...	...	...	167
Other waters	...	...	...	9
Goats' blood for anthrax	...	...	...	198
Rat fleas for species distribution	...	...	...	3,616
Soil, sludge and sewage for hookworm larvae	...	...	...	277
Rodents for plague :—				
Port Commission	...	...	...	5,596
Veterinary Department	...	...	...	20,256
Public Health Department :—				
Rats found dead	...	...	...	273
Rats killed by Clayton machines	...	...	...	3,187
Dead cats	...	...	...	3
Dead squirrel	...	...	...	1
Veterinary Department :—				
Rats for flea index	...	...	...	2,359
Miscellaneous	...	...	...	7
				36,915

Of the three dead cats and the dead squirrel examined one cat and the squirrel were found to be plague infected.

(b) Distribution of Rodents examined for Plague.

	Species.	Number examined.	Number Infected.	Percentage Infected.
Trapped rats	<i>R. rattus</i>	18,754	7	0.04
	<i>R. norvegicus</i>	4,400	5	0.11
	<i>M. musculus</i>	1,896	—	—
	Bandicoots	5	—	—
Rats found dead	<i>R. rattus</i>	147	70	47.62
	<i>R. norvegicus</i>	164	37	22.56
	<i>M. musculus</i>	45	13	28.9
	Bandicoots	1	—	—
Rats killed by Clayton machines	<i>R. rattus</i>	1,134	11	0.97
	<i>R. norvegicus</i>	1,540	6	0.39
	<i>M. musculus</i>	1,221	4	0.33
	Bandicoots	5	—	—
		29,312	153	0.52

133 specimens of the musk rat "*Crocydura caerulea*" examined and 286 mummified rats received are not included in the above figures.

(c) *Monthly Flea Index.*

Month.	Number of rats examined.	Flea Index.
January	174	2.2
February	176	2.82
March	181	1.96
April	150	1.23
May	196	1.6
June	208	2.31
July	156	2.7
August	232	2.14
September	182	2.52
October	192	2.9
November	348	2.8
December	164	3.63

INVESTIGATIONS ON THE CONTROL OF HOOKWORM DISEASE.

Previous annual reports contain references to the remarkable outbreak of hookworm disease which occurred in May, 1919, among a gang of coolies engaged in digging out an old set of trenches at the Northern Sewage Treatment Works.

The coolies developed dermatitis wherever their bodies came in contact with the soil of these trenches. Close inquiry was made into all the circumstances by Dr. Marshall Philip and the Ceylon Sanitary Commissioner, but no other source of infection could be traced than the septic tank sludge buried in the trenches at least two years previously. Numerous larvæ closely resembling, if not identical with, hookworm larvæ were found in the suspected soil.

At that time the tanks were unmodified. Sedimentation was very inefficient, the contents of the tanks being kept in a constant state of ebullition by the escape of large volumes of the gaseous products of the excessive fermentation which takes place in septic tanks at tropical temperature.

Hookworm ova and larvæ are carried through septic tanks in this condition in a few hours, and continually pass out with the effluent or with the uppermost layers of the sludge at each opening of the sludge valves. Owing to the danger thus disclosed the proposal to sell the sludge as a valuable manure had to be abandoned.

The question of the viability of hookworm ova and larvæ in soil also arose in connection with the safe disposal of the fifty-acre night-soil burial ground at Narahenpita.

For more than twenty years night-soil representing the faeces deposited by a population of some 200,000 people had been buried in these fields.

In 1922 the Water Carriage Sewerage Scheme was sufficiently completed to enable the dépôt to be closed so that the land became available for other purposes.

On August 17, 1922, another remarkable outbreak of hookworm dermatitis occurred amongst a gang of eight coolies engaged in clearing the sump of the Maligawatta Pumping Station.

It is hoped to report the full details in a medical journal, but a brief summary of the circumstances is given here.

In order to clear out the sump the nearly naked coolies immersed their bodies in the semi-liquid sludge, one at least up to his neck. Within half an hour all eight men were complaining of intense irritation of the skin, which increased to the extent of disabling them for duty on the following morning.

The writer saw these men on the evening of the second day and diagnosed the condition as hookworm dermatitis. The eruption was co-extensive with the area of each man's skin that had come in contact with the sludge. The sludge itself was found to contain typical hookworm larvæ in addition to numerous larvæ of other nematodes.

The coolies were handed over to Dr. J. F. Docherty, the Ceylon Director of the Anchylostomiasis Campaign. Most of the men were already lightly infected with hookworm. They were treated, till free from ova, with Carbon Tetrachloride and guarded as far as possible from re-infection. About eight weeks are usually required for the larvæ to reach the intestine from the skin, mature, and pass eggs into the bowel. The coolies were examined for ova at intervals and finally on the 91st day the worms were expelled with the aid of a full dose of Carbon Tetrachloride followed by salts. One of the coolies showed evidence of continual infection of doubtful origin and may be disregarded. Coolies Nos. 369, 372, and 381 remained clear of infection from their final treatment on the 21st to the 65th day, when ova began to appear in their stools. No. 428 was negative on the 58th, 65th, and 69th day; ova appeared on the 82nd. No. 458 showed no ova from the 48th to the 82nd day. This cooly then left the Island. Cooly No. 426 was free from the 21st till the 58th day. No. 387 was negative on the 40th and 58th day; ova were found on the 65th, 69th, and 82nd days. The combined centrifuge and salt flotation method was used throughout. The worm count was as follows:—

Cooly No.	369	372	381	387	426	428
Hookworms.	33	10	17	188	69	9

The species of worm was *necator americanus*.

The worms expelled may be taken to represent 98 per cent. of those actually present. Coolies Nos. 387 and 426 were the two showing the most extensive dermatitis. No. 387 was immersed in the sludge up to his neck. The number of worms recovered was perhaps less than might be expected from the degree of dermatitis. It is an interesting speculation to what extent the penetrative larvæ of domestic animals may have been responsible for some of the dermatitis.

According to Brumpt many such larvæ are capable of penetrating the human skin and setting up inflammation though unable to establish themselves in the human intestine.

The results are evidence of a new danger to the health of the labour force engaged in a tropical sewage works. Several other isolated examples of hookworm dermatitis among coolies engaged in clearing sumps or septic tanks have subsequently occurred.

It clearly became necessary to inquire into the following :—

- (1) How many hookworm eggs were contained in an average mass of fæces passed into the sewers or deposited in the trenches at Narahenpita.
- (2) What proportion of these eggs could be hatched out in sewage or beneath the soil.
- (3) How far can the infective larvæ ascend to reach the surface through typical soils.
- (4) How long can these larvæ survive in these soils or in sewage under the most favourable conditions likely to be met with in Colombo.

Some preliminary work on these problems was begun in this laboratory in 1920, shortly after the writer's return from war service, but it was not till the International Health Board of the Rockefeller Foundation assisted us with a grant of funds in August, 1922, that any serious attempt could be made to tackle these problems in the field or in the laboratory.

The results of investigations on the lines outlined above will be applicable to the control of hookworm disease in other islands in the tropics in due proportion to the similarity between their soils and climatic conditions and those of Ceylon.

General conclusions regarding the epidemiology of hookworm disease should be based on a comparison between accurate observations made in a variety of stations in the tropic zone. Similar problems are being investigated under the auspices of the Board on somewhat similar lines in various other parts of the world, particularly Trinidad and Porto Rico. A series of reports from American observers have recently appeared in the American Journal of Public Health.

The experimental results obtained in this laboratory will be published shortly in the first part of the Medical Section of the new Ceylon Journal of Science. It is hoped to report the principal epidemiological findings on a later occasion when the observations are more complete.

The experimental findings, a description of the new methods, and most of the epidemiological results were reported to the International Health Board at New York in May, 1923.

In what follows an attempt will be made to briefly consider the more important phases of the inquiry and to show what is being done to throw light upon the problems at issue.

Egg Output.

The degree of hookworm infestation of the sewage works and the Narahenpita trenching ground depends primarily on the number of female hookworms harboured by the population of Colombo.

The number of eggs passed in the fæces per female hookworm is a variable quantity. Recent research by Stoll using his recently introduced technique puts the figure at about 9,000 per diem.

The writer has devised a method for roughly estimating the average output of viable eggs by the people of the city. It is based upon counts of the number of larvæ cultivated per gramme from a representative mass of night-soil.

Now that the results of the cultivation technique can be checked by accurate egg counts, it would seem worth while to apply this method to complete the results obtained from the hookworm survey of the town organized by Dr. Marshall Philip in 1919.

According to the results of this survey 40 per cent. of the general population of the town are infected with hookworms, *i.e.*, there are about 100,000 people continually discharging hookworm eggs within the city limits.

The true measure of the degree of hookworm infestation of a population is the average number of worms per individual, *i.e.*, the worm index. Darling has worked out a technique for ascertaining the worm index of population groups, but it is extremely laborious and only accurate if the group is for the time being under full control of the observer. Assuming a worm index of only one per inhabitant, the number of eggs formerly buried each day at Narahenpita would exceed one thousand million. The number now passing into the sewers is certainly not less.

548 of the positive cases found in the course of the survey were clinically examined, 279 showed no symptoms at all of hookworm disease, 222 were slightly anaemic, 46 were evidently anaemic and exhibited marked signs of hookworm disease.

No uniform relationship exists between severity of symptoms of ancylostomiasis and number of worms harboured by a particular individual. The presence of a few worms is sometimes associated with marked signs of disease in individuals exceptionally susceptible to the worm toxin; on the other hand, several hundred of worms have been borne without apparent effect upon the health and energies of their host.

The data obtained in recent surveys in America indicate that where no other anaemia-producing disease is prevalent, such as malaria, the sub-division of the infested population into groups on the basis of the clinical signs corresponds with the grouping according to number of worms carried, and egg output. The worm index of a group showing recognizable signs would be upwards of 50. An index of 1,000 represents a very heavy infestation likely to be associated with severe or even fatal illness. The incidence of malaria in Colombo is insignificant. Ancylostomiasis is the only notable prevalent anaemia-producing disease, so that we are justified in inferring from the clinical results of the survey that the worm index must be low.

The number of viable eggs per gramme of night-soil from a latrine at Wellawatta corresponded roughly to a worm index of ten.

Egg Hatching.

The essential requirement for egg hatching seems to be a sufficient supply of oxygen in the hatching medium. In the absence of oxygen hookworm eggs do not develop. How long they can remain viable in a favourable anærobic medium is still unknown.

Till recently it was generally supposed that eggs buried in a few inches of soil or discharged into a sewer or cesspool would be unable to develop. The writer buried faeces containing numerous hookworm eggs at various depths up to three feet under soil from the Madampitiya and Narahenpita trenching grounds and under ordinary cabook. If the faeces were well mixed with the soil at the bottom of the pit abundant larvae were developed, but if masses of faeces were simply covered over development only took place on the surface of the faecal mass. Similar results have recently been obtained in the West Indies. The comparative failure of raw faecal cultures has been noted by American observers and attributed by them to the development of high acidity. The more vegetable the diet the greater the acidity, and the fewer the larvae hatching out. It would seem therefore that only a small proportion of the ova buried in night-soil at Narahenpita would be in a position to develop into larvae.

The conditions found at the sewage works are also unfavourable to the hatching out of hookworm eggs. In the laboratory eggs deposited at the bottom of flasks containing crude sewage or septic tank liquors failed to develop if air was excluded from the flasks. The development which took place in the sump of the Maligawatta pumping station and subsequently in the sumps of other pumping stations is probably to be attributed to the proximity of a ventilating shaft passing down to the sewer close to the pumping station. Moreover, several of these pumping stations are close to the "tipping depôts" where night-soil is tipped on to screens and flushed into the sewers so that a concentrated dose of fresh ova must enter the sumps each day.

Borland McVail found hookworm eggs and larvae in the effluent of 19 out of 56 septic tanks in Bengal sewage works. These tanks were unmodified. They are now being reconstructed by the authorities in Bengal with a view to reducing gasification and obtaining improved sedimentation. Ova in unmodified tanks are not only constantly brought to the surface and given access to oxygen, but are rapidly carried through into the effluent.

The work of reconstructing the tanks at the Northern treatment works, begun in 1915, was finished in 1920. Few larvae now pass through the modified tanks, only one was found in 30 litres of effluent, and none in 15 kilogrammes of sludge. It is not possible as yet to be so definite as regards ova. No other worm likely to be met with in the human intestine produces eggs resembling those of hookworm, but the worms of certain nematodes parasitic in domestic animals lay similar eggs which are difficult to distinguish from those of human hookworm and liable to be found in sewage.

Larval Growth.

After hatching from the egg hookworm larvae pass through a series of developmental changes, occupying about five days at average Colombo temperature, till they reach the stage when they become infective and are capable of penetrating the human skin.

During this period of growth, food granules are stored up in the body cells. These granules serve to nourish the mature larva till it reaches the trachea of its human host.

The immature larvae are much less resistant to unfavourable conditions than the infective forms. Under the usual conditions obtaining in nature, only a comparatively small proportion of the larvae hatched out of the eggs will reach maturity.

The most favourable culture medium for hookworm larvae appears to be vegetable humus or mould such as is produced by the decay of vegetation on the surface of the soil. In addition to this kind of substance, air, enough, but not too much, moisture, and a suitable temperature are required. The presence of acid or certain salts is detrimental to the larvae.

The dark gravelly loam at Narahenpita contains the high figure of 6.7 per cent. of humus, but is distinctly acid in reaction Ph. 5.4. In other respects it seems well suited to the development of hookworm larvae. Rich yields of infective larvae have repeatedly been obtained by mixing infected human faeces with both Narahenpita earth and mixture of equal parts of sand and dried sludge from the septic tanks. As will be seen later these larvae survived for an exceptionally long period. They must therefore have been exceptionally well nourished.

The yield of larvae obtainable from soil cultures varies greatly with the nature of the soil. Stoll reports 2.4 per cent. larvae hatched from ova in Porto Rico clay and 66.7 per cent. larvae from humus in the same locality. Sandy and sandy loam soils are intermediate.

Colombo can be divided roughly into areas where the soil is of cabook and other areas where it is principally composed of sand.

Bare cabook is somewhat deficient in the type of organic matter required for the development of hookworm larvae. Once development took place, as it might on a surface layer of vegetable mould, the larvae could survive long periods in moist cabook. Their movement however would be restricted to within a few inches of the surface.

Sandy regions are especially liable to hookworm infestation; especially where the sand overlies an impermeable stratum so that the ground water level is high.

If the surface of such a soil were well mixed with garden earth or humus, the conditions would become almost ideal for the development and survival of hookworm larvae.

Larval Activities.

The movements and general activities of the mature infective hookworm larvae are very characteristic and remarkable.

Placed in water in a shallow cell, the active larvae exhibit frequent lashing movements eventually finding their way to the margins of the cell where they remain head outwards in a continual state of agitation.

Movement increases with rise of temperature to blood heat. At lower temperatures movements may not be continuous, larvæ sometimes passing into a resting stage during which there is practically no expenditure of energy.

Larvæ in soil are found in the moisture film covering the soil particles. Their action is exerted between the resistance of the particle and the surface tension of the moisture film.

After travelling some distance through soil larvæ became noticeably more transparent due to loss of their food granules which when numerous render them opaque. The smaller the size of the soil particles, the greater the surface tension of their moisture film, the greater the resistance to larval movement and the more rapid the exhaustion of the larval store of energy which cannot be replenished from without.

Observations made in the laboratory indicate that in a soil such as cabook, permeable to water, but resistant to larval motion, larvæ will remain more or less stationary for long periods if water is regularly added.

Till recently the idea prevailed that hookworm larvæ had great powers of lateral diffusion from an infected focus. This is certainly not the case. The slight lateral migration detected in Colombo soil was easily accounted for by the mechanical action of the currents set up after addition of water to the soil. Observations in the West Indies lead to a similar conclusion.

If the moisture content of the zone surrounding the infected faeces be artificially increased on a horizontal plane lateral migration will take place, but such conditions can seldom occur in the field.

Till recently many sanitarians considered that hookworm faeces could safely be buried under a shallow layer of earth without risk of the larvæ developing and ascending to the surface. Recent research shows that burial affords no such security, unless the soil is restrictive of larval movement.

Hookworm larvæ move upwards or downwards according to the amount of moisture present in the different levels of the ground; if the ground surface is drying they descend to moisture levels; if the upper layers of the soil are moist they ascend till they reach the surface.

The extent of the vertical movements of hookworm larvæ appears to be governed principally by three factors:—

- (1) The size of the soil particles,
- (2) The distribution of the ground water,
- (3) The amount of energy stored up as food granules in the body of the larvæ.

Mature larvæ are usually provided with a sheath which protects them to some extent from adverse influences. After moving even a short distance through compact cabook the sheath is lost.

Loss of sheath is much less marked after passing through a light sandy soil of the Narahenpita type. Only 20 per cent. of the larvæ added to cabook can be recovered by Baermann's method, whereas more than 80 per cent. can be isolated from Narahenpita soil.

Preliminary experiments were made in January and February, 1923, on the vertical powers of ascent of hookworm larvæ. Stools heavily infected with hookworm larvæ and the filariform larvæ of *Strongyloides stercoralis*, after mixing with earth, were buried at the bottom of pits dug in hard cabook near the laboratory to the depths of 6, 12, 18, and 36 inches. The shallower pits were filled with coarse river sand, Narahenpita soil, and loose cabook. Both species of larvæ ascended 6 inches through all three soils, and hookworm larvæ 12 inches through each soil, and through 18 and 30 inches of sand.

It was proposed to repeat these experiments with definite quantities of larvæ, but in the meantime Florence Payne in America has published a report of such experiments in which numerous larvæ were recovered after an ascent of 36 inches through sand. She found in her experiments that the larvæ were unable to penetrate white clay, but ascended 10 inches through a red clay.

The behaviour of hookworm larvæ in the surface of soil is of particular interest. Van Durme in 1902 drew attention to the remarkable attitude taken up by the filariform larvæ of *Strongyloides stercoralis* on the surface of particles of soil. Subsequently it was found by other observers that both human and canine larvæ behave in a similar manner.

Larvæ attach themselves by one end to a particle of soil, preferably of fibrous nature, and extend themselves into the air. According to the writer's observations the motion of hookworm larvæ in this position is a slow to and fro wave movement as if continually reaching for a new support. The *Strongyloides* larvæ exhibit a rapid jerky motion.

Florence Payne reports that larvæ do not expend much energy in maintaining this position judging by the rate of disappearance of their food granules.

The larvæ may be observed to move from particle to particle on the surface by a species of looping motion. The aerial position is kept up for periods varying from a few minutes to half an hour or so at a time. Larvæ commonly cling together in aerial clusters which are readily visible to the naked eye on the surface of the soil. The surface of cultures of canine hookworm ova may be covered with waving plumes of larvæ.

The significance of this phenomenon seems clear. Perched in a favourable position on the surface of the soil the larvæ await their opportunity to come in contact with the human skin.

So far as known to the writer only infective nematode larvæ of the penetrative type behave in this manner. The free-living soil nematodes, though often very active in their movements, remain in the interstices of the soil.

Immediately contact is made with the skin a new set of forces come into play leading to the penetration of the epidermis, the passage of the larvæ to the lungs, thence to the bronchi, trachea, and oesophagus. Full development takes place in the intestines, if the host is adopted to the species of worm. *Necator americanus*, the Ceylon species of hookworm, has only two hosts,

man and the gorilla. The series of forces which brings the larvæ on to the surface of ground moistened by rain, thence to the summit of the soil particles, or as high up as leaves and twigs as the moisture film extends, thence into the skin are analogous to the forces causing a plant to bend towards the light, or which drive a spermatozoa to its destination, the unfertilized ovum.

Pintner named the force thigmotropism, which causes the larvæ to penetrate small pores. Brumpt has called the force driving larvæ into tissues histotropism. Khalil has recently described, under the name of thermotropism, the tendency of hookworm larvæ to move towards a heated point. The tendency of these larvæ to extend themselves into the atmosphere may be called aerotropism.

It is sometimes difficult to separate hookworm larvæ present in soil, from the free-living forms having a somewhat similar appearance.

If a great variety of larvæ are recovered from a mass of soil the task of scrutinizing them all under the microscope in order to make an accurate count of the hookworm larvæ is often excessively laborious.

Progress in hookworm research work has been mainly a question of development in technique. It was Baermann's discovery in 1917 of a convenient and reasonably quantitative method for isolating nematode larvæ from soil, which gave the impetus to modern research into the epidemiology of hookworm disease.

The writer has sought to facilitate the task of separating hookworm larvæ from free-living forms by taking advantage of the tropic reactions described above. It was found that hookworm larvæ will penetrate porous membranes such as filter paper, chamois leather, or buckskin with great ease. Non-porous leathers, parchment, rubber and similar substances are not penetrated. Larvæ penetrate into a membrane made of freshly dissected skin, but seldom pass through it.

The next step was to bring a membrane retaining a suitable fluid at blood temperature in an inverted tube or vessel lightly into contact with the surface of soil containing larvæ. The aerially extended larvæ then pass upwards through the membrane into the fluid where they may readily be recovered free from soil particles and almost free from non-infective larvæ. The results are somewhat affected by the temperature of the atmosphere. It may be necessary to cool the under side of the receptacle containing the soil. A buckskin membrane was commonly used in these experiments.

A curious phenomenon was noted during these investigations (September, 1922, to January, 1923). If a pan of soil showing numerous aerially extended larvæ be placed in the incubator at 37° C. all the larvæ disappear from the surface of the soil. They re-appear in a few minutes at room temperature on the laboratory bench.

The technique can be adopted to any quantity of soil.

A second test found of value is that of applying the suspected larvæ to the skin of a rat. If the suspected larvæ are able to reach the lung of the rat within three days with production of haemorrhagic congestion of the organ the result of the test is considered to be positive. Both canine and human hookworm larvæ give positive results to this test, provided sufficient numbers of larvæ are applied to the skin. Penetrative nematode larvæ of other species should doubtless give similar results. Free-living larvæ give negative results.

Tests of this kind cannot entirely replace the crucial experiment of applying the larvæ to the human skin and expelling any hookworms developed but enable such troublesome experiments to be reduced to a minimum.

Larval Life.

The viability of the infective hookworm larvæ is clearly a matter of great epidemiological importance and has accordingly been studied by numerous observers in various parts of the world.

Most of the workers in temperate climates were able to keep the larvæ alive for upwards of a year. Baermann in Sumatra observed living larvæ up to six months in a shady soil.

A series of reports, however, has recently been issued by the team of American observers working under the direction of W. W. Cort, placing the extreme length of survival of hookworm larvæ in the tropics at six to eight weeks. The experiments were carried out in Trinidad. The number of larvæ present in the soil diminished rapidly, both in the field under natural conditions, and in laboratory experiments.

This conclusion, if correct, would justify a more optimistic view of our prospects of controlling the spread of the disease. The risk of infection from walking barefoot over such sites as that at Narahenpita or of handling sludge at Madampitiya would become negligible in a few weeks.

Before describing the results of the series of observations made in the laboratory, the principal factors governing the length of life of hookworm larvæ in soil may be briefly considered.

Stress has already been laid on the effect of rich culture media in supplying the larvæ with a good store of food granules during their development from the egg to the infective stage. Larvæ grown under poor conditions cannot be expected to live long. A constant supply of moisture is essential to long larval life. Much depends upon the temperature; comparative observations made in this laboratory at room temperature 80° F. and in the incubator show that larvæ die out twice as rapidly at blood heat both in soil and in liquids. This is due to the increased larval activity produced by rise of temperature and the more rapid exhaustion of their food reserve. The constitution of the soil is of importance; in fine soils much more energy is wasted in reaching the surface. Acid soils and soils containing excess of salt are most unfavourable to the larvæ.

Similar results therefore can only be expected under similar conditions.

Observations were made on the length of life of hookworm larvæ both in the field at Narahenpita and in the laboratory in various soils contained in pots and jars, and in a trench in the laboratory grounds.

The Narahenpita trenching ground was divided into blocks and each block into numbered trenches. To prevent water logging the trenches were covered with ridges of earth. Abundant crops of grass are raised on the site and sold as cattle food. The whole area was trenched over in about eighteen months. As accurate records were kept of the numbers of the trenches dug each day in any block the number of days since night-soil was buried in any particular trench was definitely known.

The observations, begun in 1920, were brought to a conclusion some months after the closing of the dépôt on June 27, 1922.

Larvæ apparently identical with hookworm larvæ could be recovered in small numbers from the soil of trenches up to 113 days old.

A report by Mhaskar has just appeared on the survival of hookworm larvæ in a similar trenching ground at Trichinopoly, India.

Larvæ were recovered up to 14 weeks (98 days).

On December 21, 1922, heavily infected human fæces were buried in an eighteen-inch trench dug in the cabook behind the animal house at Maligakanda. The trench was watered daily. The day before the writer left the Island for Europe a few larvæ were still present in the soil of the trench, *i.e.*, 88 days after the commencement of the experiment.

Conditions in the field are variable, particularly as regards rainfall. A rapid increase of larval mortality may be produced by a spell of dry weather or some other temporarily unfavourable factor.

What the sanitarian needs to know are the maximum length of survival and some idea of the rate of mortality under the most favourable conditions likely to be met with in his locality. To throw light upon this problem a series of laboratory experiments were carried out, in which an attempt was made to eliminate the influence of unfavourable factors. The results of the more important experiments are summarized in the following schedule.

Experiment No.	Nature of Soil.	Kind of Receptacle.	No. of days Larvæ Survived.	Rapid falling off in numbers after
1	Sand and sterilized sludge equal parts mixed with infected human fæces	Baking pan	124	68 days.
2	Sand and sterilized sludge equal parts mixed with infected human fæces	Baking pan	108	87 days.
3	Sterilized Narahenpita earth with hookworm stool	Baking pan	124	89 days.
4	Sterilized Narahenpita earth with hookworm stool	Baking pan	120	78 days.
5	Sterilized Narahenpita soil finely sieved	Pot	14	1 day.
6	Sand and unsterilized sludge	Pot	9	1 day.
7	Unsterilized cabook soil	Pot	120	69 days.

The two inches of earth in the pans was protected from flies by wire gauze, covered with a layer of wood ash and watered daily with a sufficient uniform amount of sterile distilled water to keep it slightly moist. The pans were perforated for drainage. The pots were ordinary flower pots of the cylindrical pattern. Larvæ cultivated from human fæces were placed in the upper three inches of the soil in the central axis of the pot. There was very little lateral and no downward migration.

Sterilized soils were only heated sufficiently to kill any nematode larvæ present and not enough to markedly affect their chemical composition.

The rapid disappearance of the larvæ in experiment No. 5 was undoubtedly due to the impermeability of the finely sieved soil to water. A solid crust formed on the surface. In its natural condition full of coarse matter, root fibres, &c., this soil is readily permeable to water. The disappearance of the larvæ in experiment No. 6 may be attributed to putrefactive changes in the soil. Swarms of protozoa were present which may have had a detrimental influence on the larvæ. Numbers of dead larvæ were recovered from the pots showing much the same degenerative appearance as larvæ kept in septic tanks for over three days. These two experiments serve to illustrate the operation of unfavourable factors on the survival of hookworm larvæ.

Some of the larvæ kept in tubes filled with Colombo tap water exhibited active movements of translation up to the 98th day. A few could still be stimulated to move a little after nine days.

The larvæ in all these experiments became more and more transparent with increasing age.

The results of the Trinidad experiments show a rapid larval mortality from the first few days of the experiment.

The larval numbers did not fall off rapidly in the course of four of the Colombo experiments till about the 70th day.

On the basis of the writer's results six months would seem a fairly safe limit for the survival of hookworm larvæ under conditions likely to be met with in Colombo. During the hot dry weather the viability of the larvæ would be much less, whereas upcountry it would be probably much greater.

More information is required concerning the rate of re-infestation after treatment. This rate seems the best epidemiological guide to the sanitary state, qua hookworm, of any particular district. The rate depends not only on the degree of hookworm infestation of the soil itself, but also on the sanitary habits of the population group.

Baermann was disappointed to find that heavily infected coolies working in rubber and tobacco estates in Sumatra, after a thorough course of treatment for hookworm disease, became steadily re-infected till finally after one to two years they harboured an average of about 738 worms and consequently urgently required another course. The average number of worms acquired per day rose from '75 to 1.3 per cooly. Latrines were used in these estates. Baermann traced the source of infection to patches of larvæ infected soil in the neighbourhood of these coolies' dwellings. The larvæ were probably brought to the spot originally in particles of faeces adhering to the coolies' feet after a visit to dirty latrines. Each day the coolies had occasion to visit the infected spot and acquire additional infection.

As hookworm larvæ do not die out rapidly in the common Ceylon soils investigated there would be ample opportunity for the establishment of infective foci on the surface of the ground, especially in those districts unprovided with latrines.

The continued infectivity of these soil foci would depend upon the balance between the rate of death of old, and the rate of development of new, larvæ in the same situation. A vicious cycle tending to continually increase human infestation would become established under particularly unfavourable conditions as regards soil infestation.

It is difficult to know what interpretation to place on the epidemiological data relating to the Madampitiya outbreak in 1919. The conclusion arrived at by several independent investigators, that hookworm larvæ must have survived in the soil at least two years is not likely to be accepted in the present state of our knowledge without absolutely convincing evidence.

The results of the writer's investigations do not exclude the possibility that hookworm eggs or larvæ may under a specially favourable combination of circumstances, remain in a dormant or resting stage in the soil for extraordinarily long periods.

It is probable, however, that larvæ seldom survive for such exceptional periods under tropical conditions.

There are three principal measures for the control of hookworm infestation among a bare-footed population.

- (1) Periodic treatment campaigns.
- (2) Provisions of sanitary latrines and education in their use.
- (3) Paving or hard packing of the ground surface in the vicinity of dwellings.

The relative utility of the third measure increases in proportion to the viability of larvæ in the soil covering the ground near human dwellings.

An infestation rate of 40 per cent. of the population is somewhat high for a well latrined city such as Colombo and is probably to be accounted for by the suitability of much of the soil for the development and survival of hookworm larvæ.

Though there is little actual hookworm disease due to the direct action of the parasites yet this degree of infestation must have a considerable indirect effect in lowering the general vitality of the population and decreasing their powers of resistance to more serious diseases.

The steady increase, which is taking place, in the number of water carriage latrines and of hard paved surfaces, near human dwellings should bring about a gradual decrease in hookworm infestation throughout the city and a corresponding improvement in the public health.

CONCLUSIONS IN REGARD TO CONTROL OF HOOKWORM DISEASE.

- (1) The reconstruction of the septic tanks at the sewage works has not only improved the effluent chemically and physically, but diminished the risk of hookworm larvæ passing out with the effluent or sludge.
- (2) The sludge from the septic tanks may be safely sold as manure after being thoroughly sun-dried and kept in dry store for six months.
- (3) The site of the Narahenpita trenching ground is now free from hookworm infestation derived from buried night-soil.
- (4) The labour force employed in clearing the sumps and sewers are exposed to grave risk of contracting hookworm disease. The sumps of pumping stations should be emptied as far as practicable by mechanical means. Coolies should not enter the sumps or sewers without adequate protection for their feet and hands.
- (5) Hookworm larvæ are capable of ascending a considerable distance through loose soils. Hookworm infected faeces cannot be buried in such soil without risk of infecting the surface of the ground.
- (6) Hookworm larvæ cultured in soils rich in organic matter can survive at least four months in typical Colombo soils.

PLAQUE.

The survey of the species distribution of rat fleas throughout the city, begun in November, 1922, and continued through two plague seasons, will be completed this year.

So far upwards of 8,000 fleas have been examined. The results will be analysed in detail for the next annual report in which it is hoped to deal comprehensively with the whole subject of the plague investigations carried out in this laboratory since the first survey of rat fleas was made in 1912, and the new species *X. astia* was discovered upon rats.

It is now quite clear that the distribution of *X. cheopis* within the city boundaries is correlated with the distribution of both human and rat plague and with the storage of imported produce. Approximately 75 per cent. of the fleas caught on rats from the Customs premises and Government granaries are *X. cheopis*. A severe epizootic of plague occurred amongst these rats during the month of May. About 30 per cent. of the rat fleas in the endemic plague zone are *X. cheopis*. The proportion of cheopis found on the rats of Fourth Cross street rose to 80 per cent. in November, simultaneously an epizootic broke out among these rats.

A large proportion of cheopis is found upon the rats of the districts near Dean's road market and in Slave Island, where plague so frequently recurs. Plague broke out last year at the cheopis focus shown in the map near Grandpass market. A rat epizootic is now in progress. Where sporadic cases of plague, or temporary foci of cheopis, occur elsewhere outside the endemic zone, it usually transpires that grain or forage has recently been imported into the neighbourhood from the plague zone.

The indigenous rat flea is *X. astia*. Over 98 per cent. of the fleas harboured by rats in plague free districts belong to this species.

During the writer's absence Mr. Woutersz set apart rat fleas from the plague zone in labelled and dated tubes. These fleas have now been examined. A similar collection will be carried on for a year. This material will provide data for a curve showing the seasonal incidence of plague in relation to the seasonal variations in the proportion of cheopis among rat fleas in the endemic zone.

The results so far are disappointing in that they show a much greater carry over of cheopis during the off plague season than was anticipated on the basis of observations made in previous years. Plague itself carried over to an abnormal extent.

The explanation is probably to be found in the excessive amount of rain which fell during the period in question.

A further series of transmission experiments are in progress with the special object of testing the power of astia to transmit plague at temperatures below those prevalent in Colombo.

In last year's report it was suggested that astia might be able to carry plague at upcountry ranges of temperature.

The experiment has just been made (1924) of keeping infected fleas at a temperature of 70—75° F. in an ice box. A positive result has been obtained with one out of sixty-eight infected astia. This flea became temporarily blocked by growth of plague bacilli in the gizzard. The regurgitant phenomenon was typical. Two out of three rats bitten by this blocked astia died of plague.

Further attempts have been made to transmit plague from rat to rat by means of *X. astia* under the most favourable climatic conditions met with in Colombo. As in the previous years the results were entirely negative. On the other hand, successful transmissions with *X. cheopis* have once more been obtained.

Much more work on the bionomics of astia and cheopis is required before the general relationship of these two fleas to plague prevalence can be finally determined, but it is now clear that cheopis is a much more efficient vector of plague than astia under conditions which are not specially favourable to the spread of the disease.

The two principal factors influencing the spread of plague by fleas are (1) the vector efficiency of the particular flea, (2) the number of fleas.

It was formerly assumed that climate would exert a similar effect upon all *Xenopsylla* found on rats. Researches in this laboratory show that this is not the case.

As the weather becomes hotter the average number of fleas per rat diminishes, the cheopis number more rapidly than the astia number, the power of each flea to transmit plague also diminishes, the cheopis power less rapidly than the astia power.

During the cool weather of 1922-23 Taylor and Chitre carried out a series of comparative experiments on the relative efficiency of cheopis and astia as vectors of plague in Bombay.

A comparison of the results of the Bombay and Colombo experiments supports the conclusion that the power of cheopis to transmit plague is less affected by climatic conditions than astia.

The climatic conditions were decidedly more favourable to transmission in the Bombay series of experiments, but a greater proportion of positive results have been obtained with cheopis in Colombo. Madras rats, the most susceptible obtainable in India, were used in the Bombay experiments. Cheopis was found to be a slightly more efficient carrier from rat to rat, and a much more efficient carrier from guineapig to guineapig.

In last year's annual report, and in address read before the annual meeting of the Royal Society of Tropical Medicine, the writer put forward the theory that variations in the incidence of plague can be correlated with the direct influence of climate on the activities of rat fleas, particularly their biting powers. It is hoped that investigators will investigate this hypothesis as opportunity arises.

It is very interesting to note that F. W. Cragg in a further report on his rat flea survey of India obtained a coefficient of correlation of 0.879 probable error 0.057 between cheopis and plague for a group of Indian ports including Bombay, Karachi, Madras city, and Rangoon, but a coefficient of only 0.250 probable error 0.198 for the Punjab. This result is in accord with the above mentioned suggestions with regard to the effect of climate upon astia.

Major Cragg has also published a valuable but incomplete contribution to our knowledge of the bionomics of astia.

The writer's views on the factors principally governing the spread of plague are not yet accepted by some of the former Plague Commissioners, but are now receiving serious consideration.

SPOT MAP. E.

COLOMBO

Mile
0
500
1000
2000
Scale 50 Chains to an Inch (R. F. 1:250000)

DISTRIBUTION OF X. CHEOPIS ON AN

APPROXIMATELY EVEN DISTRIBUTION OF RATTUS

RATTUS EXAMINED FROM ALL PARTS OF THE

CITY IN 1923



The comments of Major Justice upon my paper on the spread of plague in the East Indies lead me to infer that plague is spread in the lowlands of Madras in much the same way as in the city of Colombo, viz., in cheopis infested merchandise.

Significant differences were discovered during the year between the biting powers of cheopis and astia on both rat and man which help to explain the difference in their efficiency as vectors of plague.

The theory that cheopis has a special relation to plague, and consequently that the species distribution of rat fleas has great practical importance, is gaining ground in many quarters. Attention is drawn to Professor Ashworth's presidential address to the Section of Zoology at the Annual Meeting of the British Association on "Some Bearings of Zoology on Human Welfare."

There is evidence that the proportion of *X. cheopis* is diminishing on the rats caught in those parts of the plague area where the old underground drains have been abolished in the manner described in the Chairman's Administration Report for 1922.

In this connection it is interesting to note that the temperature of the air in these sewers is lower and the relative humidity higher than above ground. Conditions are favourable to the breeding of cheopis on the numerous rats harboured in those sewers; transmission by cheopis would be facilitated throughout the year, while transmission by astia would become possible during the coolest months of the year among the rats living underground.

As the improved area extends we may reasonably expect to see a reduction in the incidence of plague in the endemic zone.

WATER SUPPLIES.

During my absence on leave in Europe I took every opportunity of obtaining information and expert advice with regard to the difficult problem of discovering the best means of preventing incrustation of the pipes and removing certain objectionable matters, dissolved, or in colloidal suspension, in the Colombo water supply.

During 1921, I found by experiment that filtration through an activated coke would achieve the desired result.

It appears that absorptive carbons of this type are now being placed on the market in Great Britain for the treatment of water supplies.

When the work of raising the Labugama dam is finished, and the additional rapid mechanical filters installed, the time will have come to make additional provision for aeration and prefiltration.

The Waterworks Engineer, the City Analyst, and myself are agreed that the objects aimed at could be best achieved by spraying the lake water on the surface of scrubbing filters containing the substance found to exert the greatest purifying action on the water at the most reasonable cost.

Means would have to be provided for efficiently washing the scrubbing materials.

L. F. HIRST,
Municipal Bacteriologist.

March 15, 1924.

Annexure C.

REPORT OF THE CITY ANALYST FOR 1923.

I HAVE the honour to submit my annual report for 1923. Analyses consisted chiefly of milks, town and well waters, aerated waters, and miscellaneous articles including coarse teas made from tea prunings and other leaves.

The following table shows the monthly analyses:—

January.			May.		
		Number of Samples.			Number of Samples.
Milks	...	88	Milks	...	84
Town water	...	14	Well water	...	9
Well water	...	4	Town water	...	14
Sewage	...	2	Soda water	...	3
February.			June.		
Milks	...	86	Milks	...	80
Town water	...	14	Town water	...	19
Town water—for lead	...	13	Well water	...	1
Well water	...	8	Tea	...	1
March.			July.		
Milks	...	83	Milks	...	72
Well water	...	3	Town water	...	14
Town water	...	14	Well water	...	4
April.			Soda water		
Milks	...	85	August.		
Town water	...	14	Milks	...	88
Well water	...	4	Town water	...	14
			Well water	...	1
			Sand	...	1

September.		Number of Samples.	November.		Number of Samples.
Milks	...	101	Milks	...	78
Town water	...	14	Town water	...	14
Soda water	...	1	Well water	...	3
Tea	...	1	Soda water	...	1
October.		December.			
Milks	...	83	Milks	...	92
Town water	...	15	Town water	...	14
Soda water	...	3	Well water	...	1
Block tin	...	1	Soda water	...	3
			Teas	...	10
				Total No. of Samples	1,273

The summary of the analyses is as follows:—

Total number of milks	...	1,020 including condemned samples	...	202
Total number of town waters	187	including condemned samples	...	Nil.
Total number of well waters...	38	including condemned samples	...	30
		also suspicious samples	...	6
Total number of mineral waters	12			
Total number of teas	12			
Total number of sewages	2			
Total number of miscellaneous	2			
		Total ... 1,273		

With regard to the milk samples the percentages of adulteration are shown in the following table:—

Month.	1-5 per Cent.	6-30 per Cent.	31-50 per Cent.	51 per Cent. and over.	Maximum added water.
January	...	11	6	4	55
February	...	10	11	3	68
March	...	8	5	1	53
April	...	13	8	3	67
May	...	11	14	1	55
June	...	11	9	2	59
July	...	6	9	4	65
August	...	11	11	3	55
September	...	9	8	2	57
October	...	4	11	1	52
November	...	9	14	4	68
December	...	12	17	1	55
	115	123	50	29	

Out of the total number of milks examined 202 samples or 19.8 per cent. were condemned.

Of the condemned samples 12.06 per cent. contained 5 to 30 per cent. added water, 4.9 per cent. from 31 per cent. to 50 per cent. added water, and 2.8 per cent. over 51 per cent. added water. The maximum addition was 68 per cent.

In addition to these, 115 samples or 11.27 per cent. were found to contain from 1 to 5 per cent. added water.

Town Waters.—During April last an earthy taint was developed in the water due to heavy rains after a dry period in the catchment area at Labugama. The chemical composition was not effected.

Soda Waters.—Traces of copper were found in some samples, but not to a harmful extent.

Well Waters.—Of the 38 samples examined, 30 were condemned as unfit for human consumption and a further 6 samples were of suspicious character. Only 2 samples were satisfactory as regards their chemical composition.

Teas.—Samples of very poor grade teas were examined. Analyses showed that they were chiefly composed of the products of the tea bush, but in some instances they contained other leaves probably rubber, while in others the tea leaf had been previously infused and redried indicated by the low total extract.

This varied from 7.9 per cent. to 36.4 per cent. the latter approximating that of normal tea. The percentage of ash was usually abnormally high, due in some cases to the presence of sand up to 13.9 per cent. Caffeine on which the stimulating properties of tea largely depend was low, generally under 0.5 per cent. in the coarse samples.

Most of the samples had a strong musty smell, especially those containing over 10 per cent. of moisture.

Although of very poor quality, there is no evidence that such teas are unfit for human consumption or that the boiling water infusion would be injurious. If sold as "Ceylon Teas" however they are more or less a fraud on the public, and would do great harm to the industry generally.

It is advisable that a standard should be fixed for Ceylon tea, which would preclude the use of such coarse and inferior material. Such standard should be based on the caffeine, total extract, and ash and the amount of ash soluble in water. The two former decrease with the age of the leaves, while the total ash increases.

